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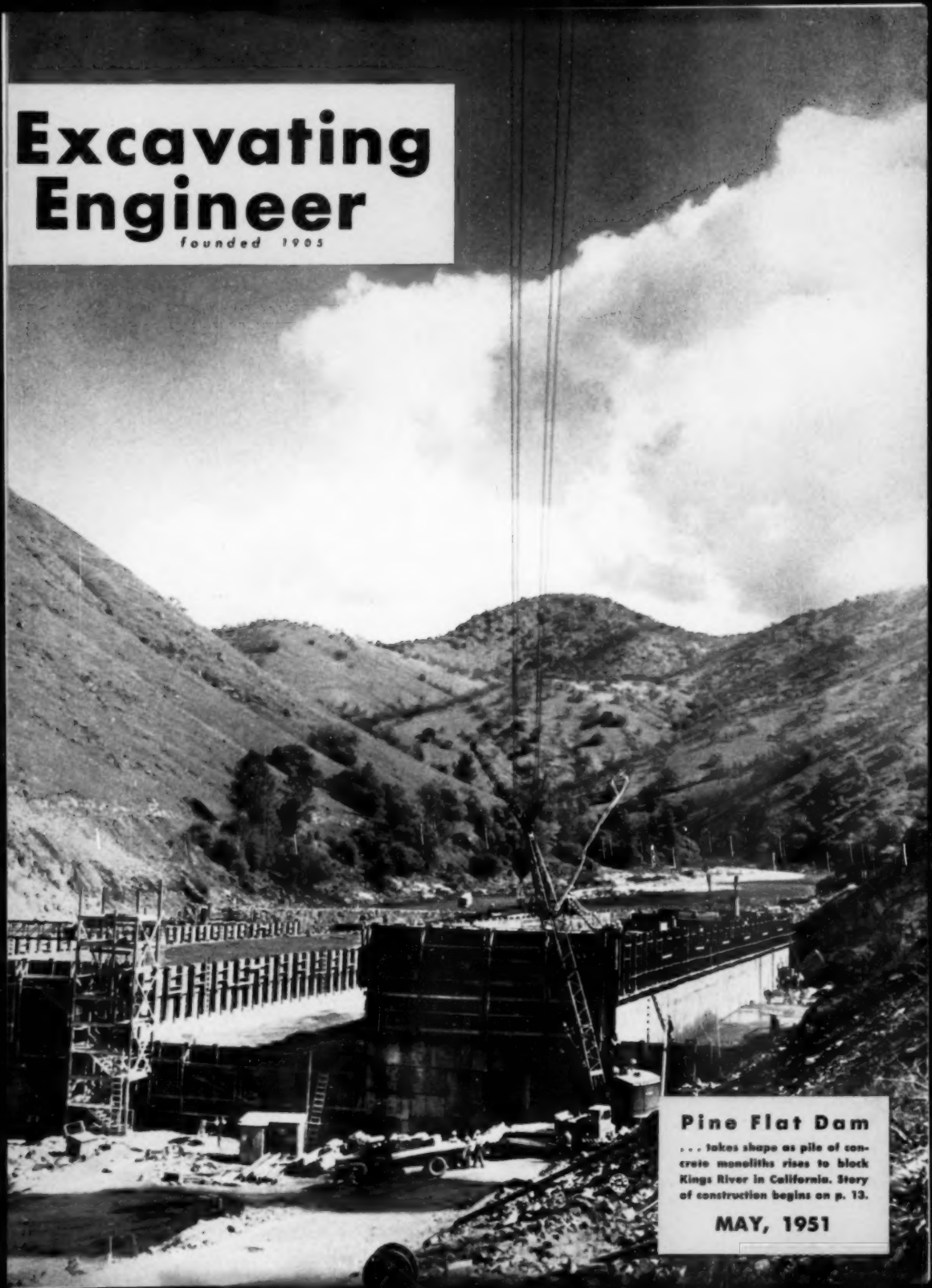
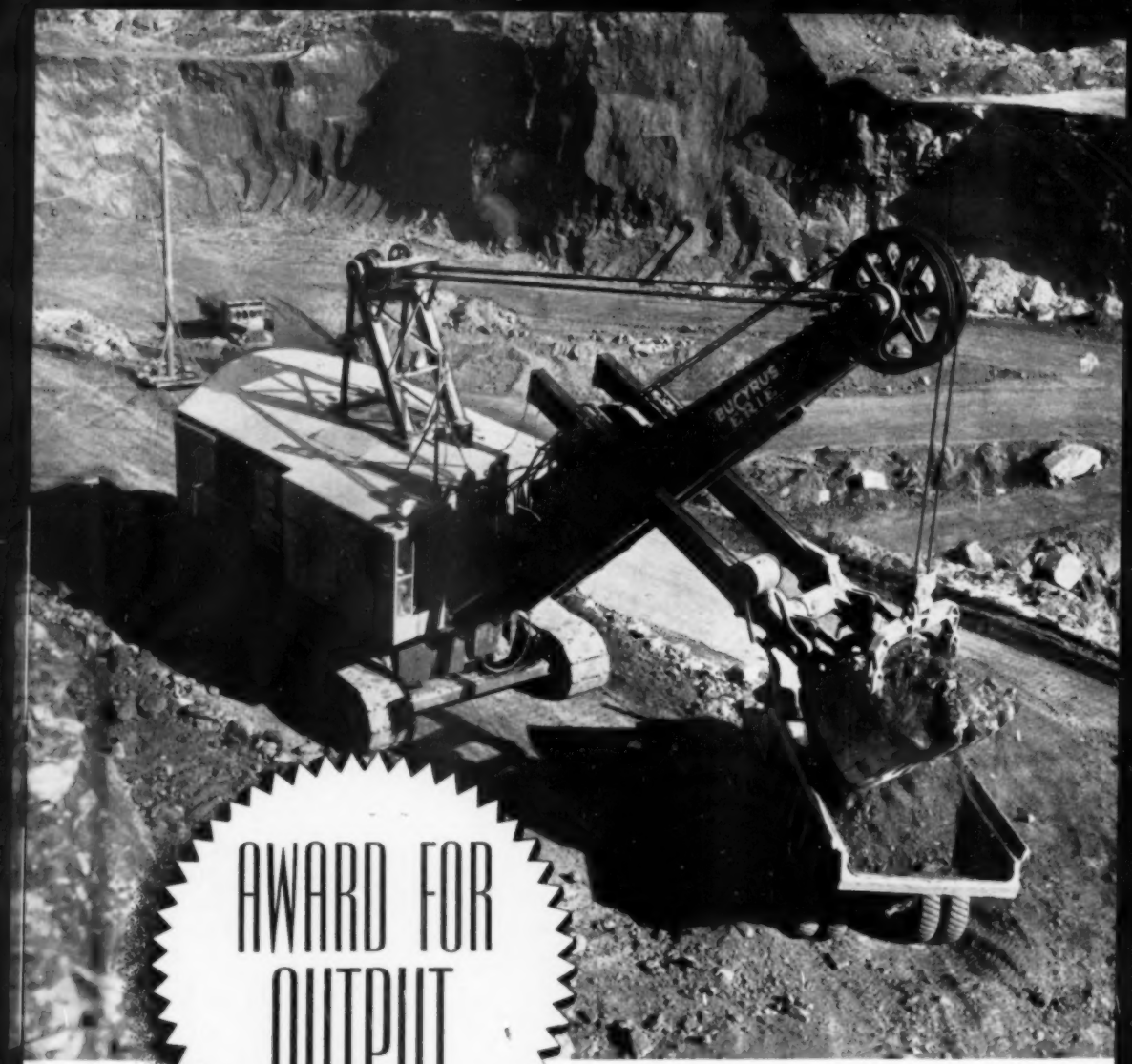


Pine Flat Dam

. . . takes shape as pile of concrete monoliths rises to block Kings River in California. Story of construction begins on p. 13.

MAY, 1951



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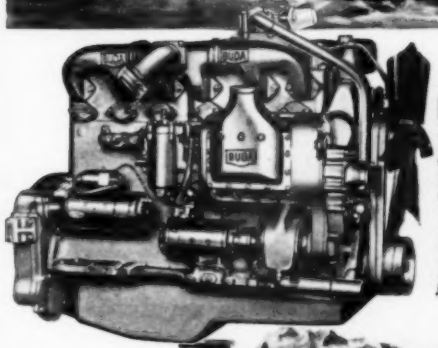

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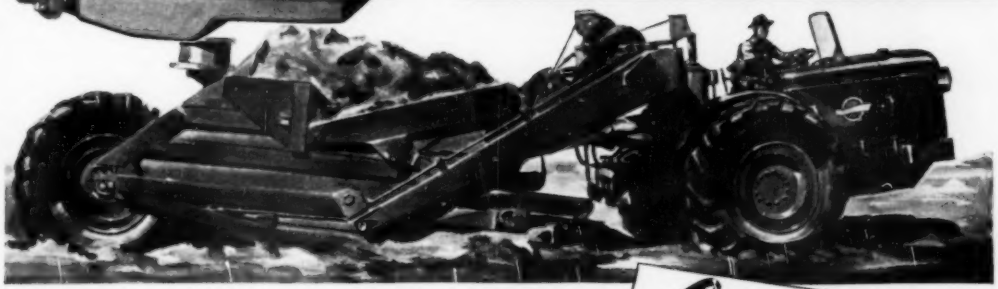

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Excavating Engineer

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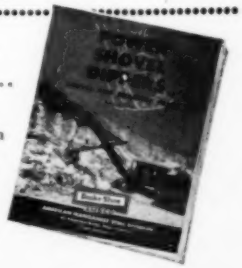

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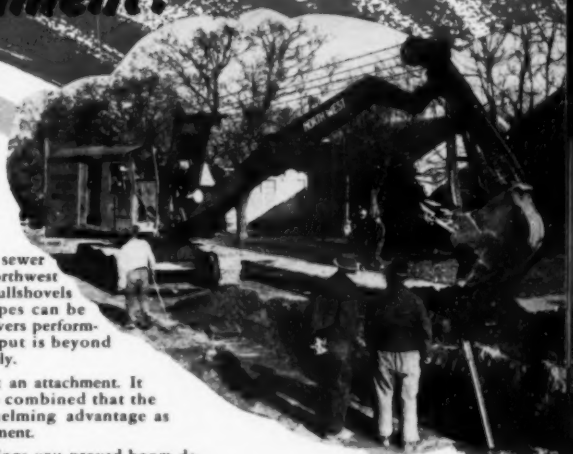

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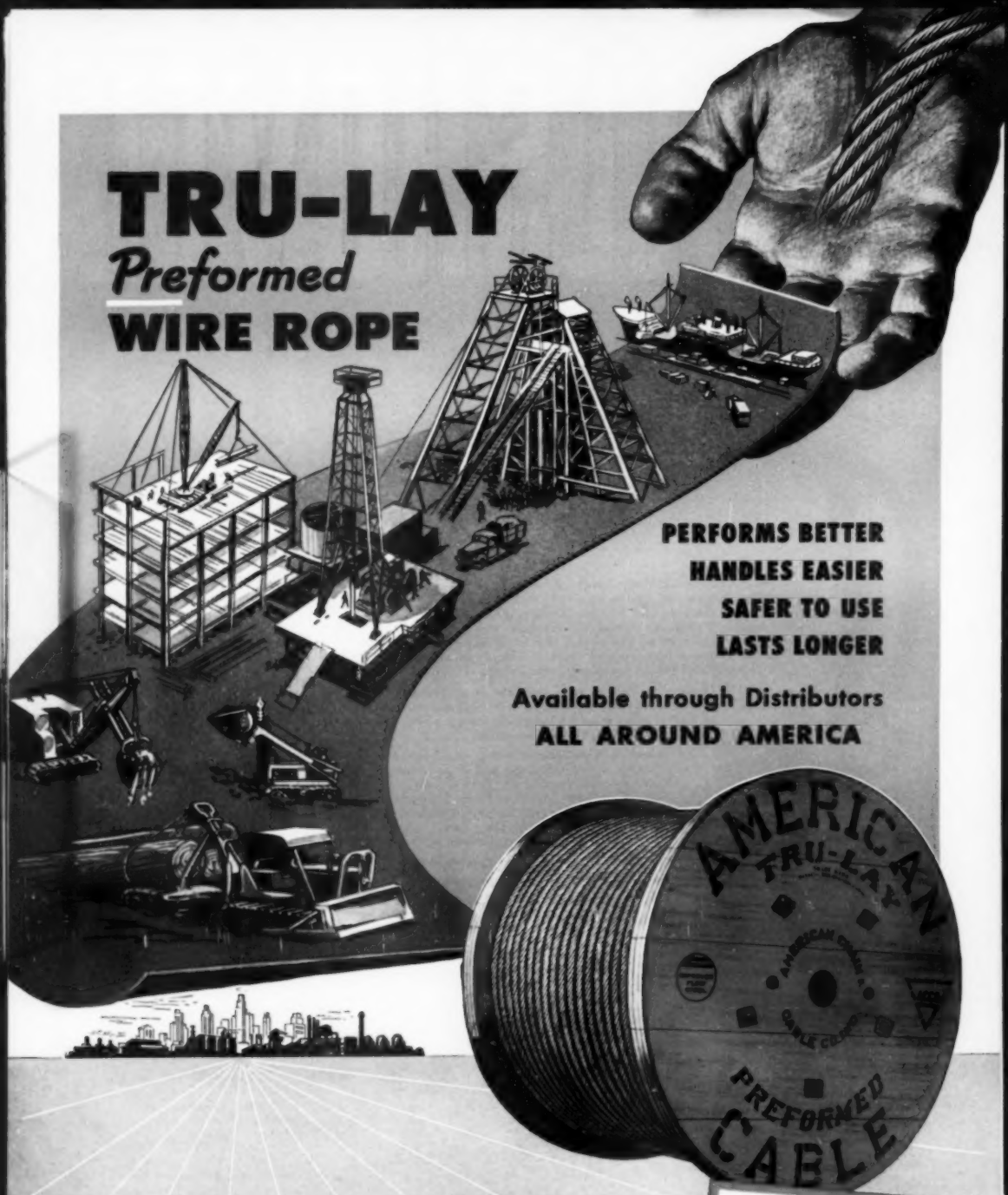

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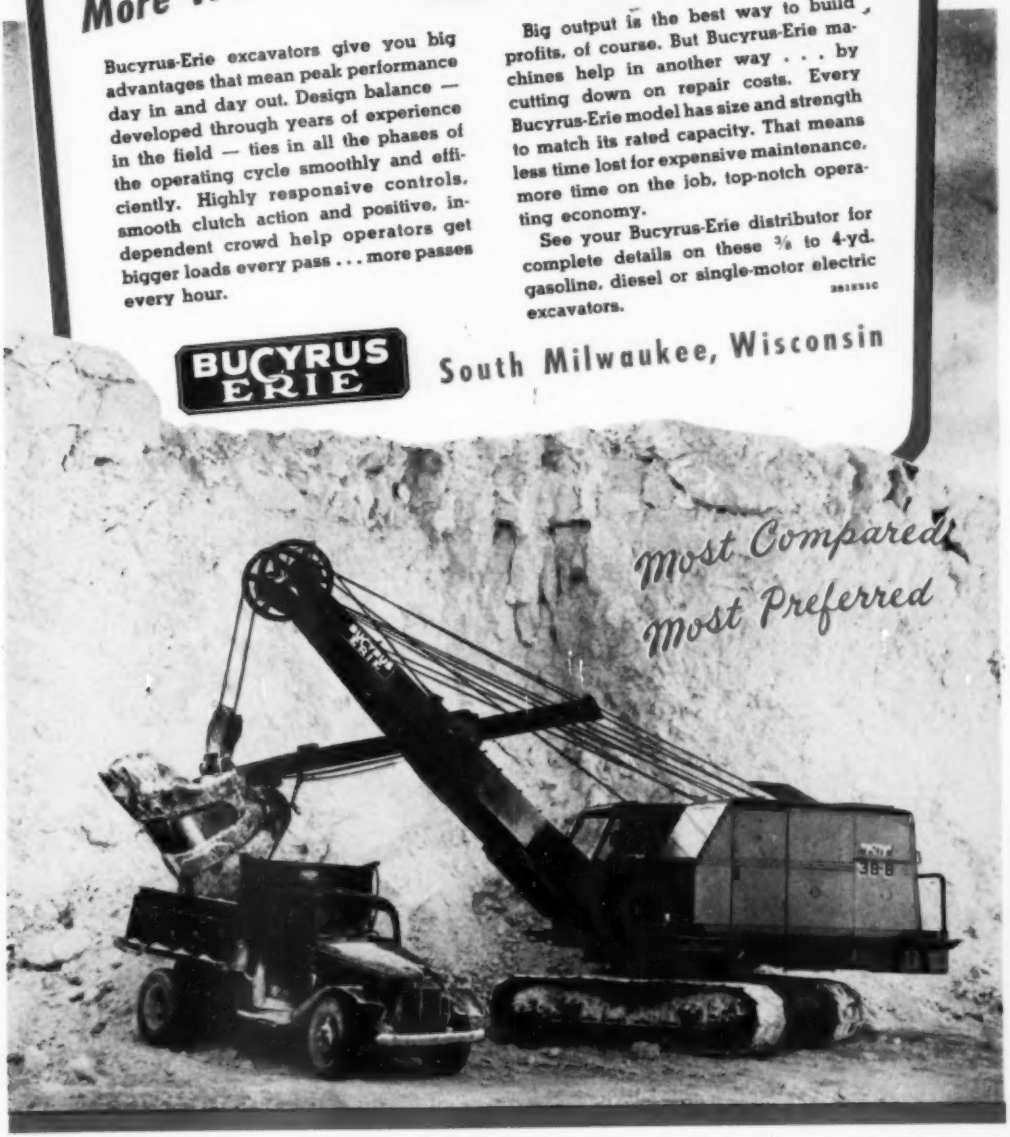

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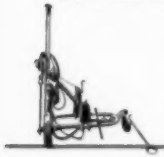
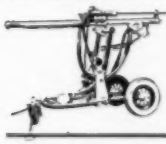
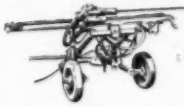


Notice how the swivel wheels are turned and how the drill extends beyond wheels for line hole work against a face.

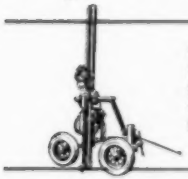
And how low the yoke can be lowered for efficient toe hole drilling.



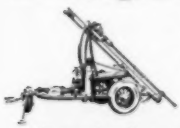
Or how, by a handy crank actuating a powerful worm gear arrangement, the yoke and drill can be easily raised to highest drilling position.



Here's an exceptionally stable and easily moved set up for drilling hole after hole along a face.



What could be more convenient for line hole work? It takes but a minute to swing the swivel mounted wheels through a 90 degree angle.



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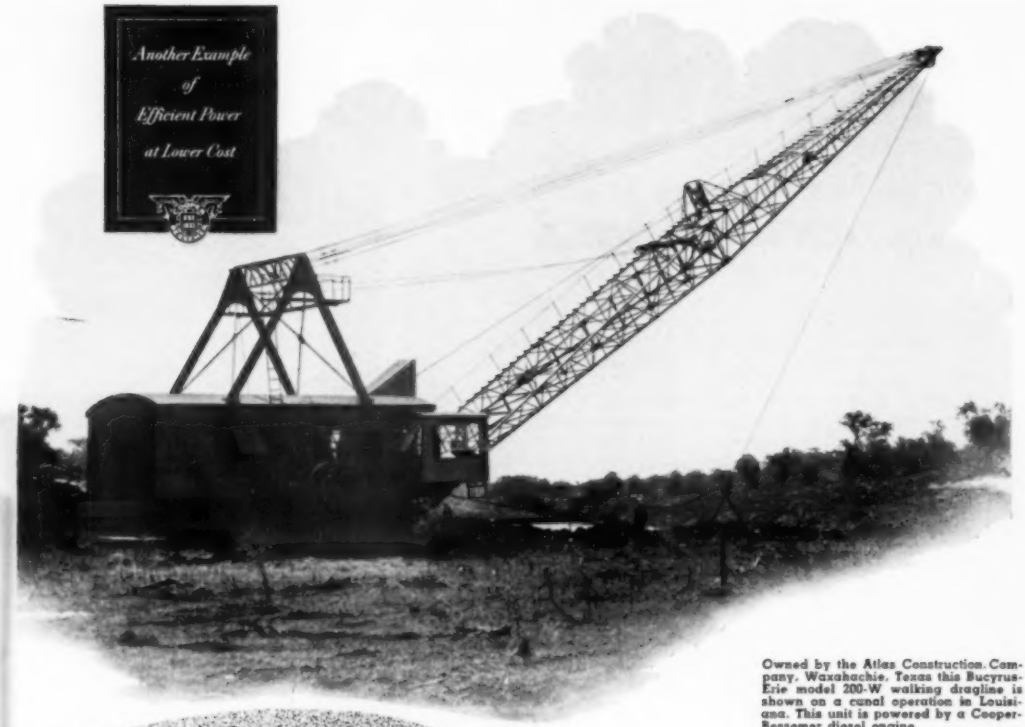

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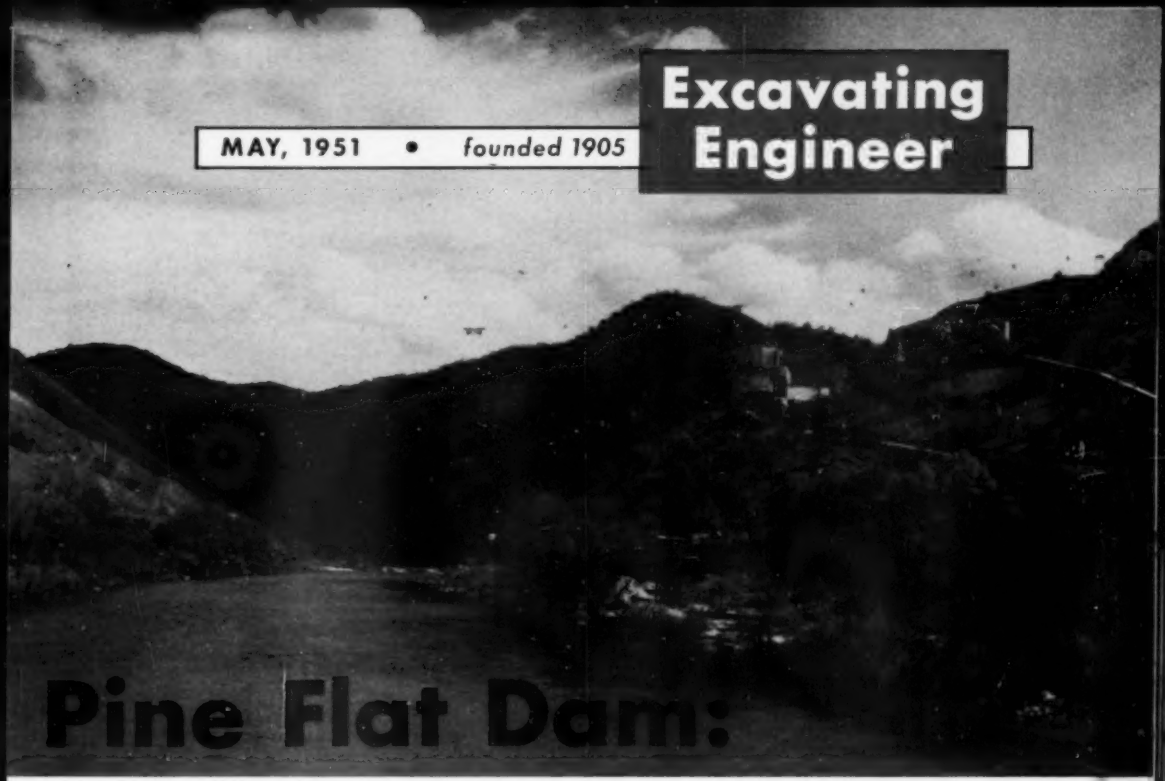


Pine Flat Dam: a battle with a river

By Robert J. Green

THIRTY miles east of Fresno, Calif., where Kings River emerges from the high Sierra Nevadas, a battle is under way. It is a fight between men and a river, and so far, the river has delivered the major punches. Some of the most untimely and discouraging breaks have favored the river. Major floods, including the worst one recorded in a century, have come when the water usually is no more than a trickle.

Compared to the swift destruction Kings River has wrought, the efforts of men seem sluggish. Nevertheless, equipment and plans and manpower are being marshaled. The inexorable squeeze of modern construction is on the river.

The Sacramento District of the Corps of Engineers is supervising the construction, and a joint-venture group of contractors known as Pine Flat Contractors has the $24,339,776.50 contract. Member firms in the joint venture include Guy F. Atkinson Co., the sponsor; Bressi & Bevanda Constructors, Inc.; Chas. L. Harney, Inc.; J. A. Jones Construction Co.; and A. Teichert & Son, Inc. No one can tell what may develop as a result of international unrest, but if this factor does not influence completion of the project, it should be finished late in 1953.

After twice digging out when record floods penetrated their cofferdam, Pine Flat Contractors are again making good progress on construction of the tall concrete dam in south central California. The joint-venture group holds the $24½ million contract for the big structure that will hold back the Kings River.

Dam is Urgently Needed

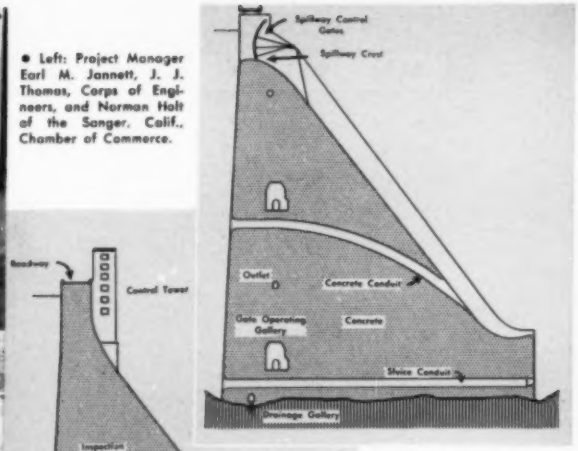
For 80 years, men have known that something would have to be done to tame the river. At the Pine Flat site, it is normally a fast, clear mountain stream. It pours down on the rich agricultural land of Tulare Lake Basin and sometimes overflows through Fresno Slough into the San Joaquin River. Most of the trouble with the Kings River occurs during the early spring flood season, when snow packs melt in the high Sierras. Farmers down in the valley, who need the water desperately during the hot months, have for years watched the whims of the river deliver water in deluges at a time when it could not be used to best advantage.

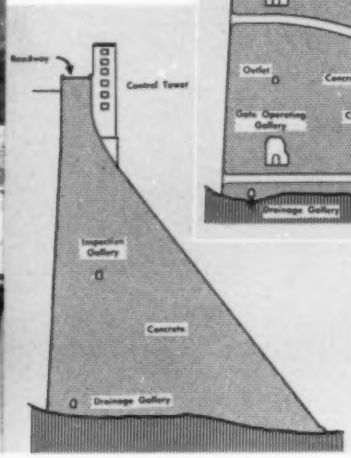
Construction of Pine Flat Dam will change that situation. The big 440-ft. high concrete barrier will trap and hold 1,100,000 acre-feet. That reservoir capacity is sufficient to take care of practically any floods that could occur in the future. The water thus stored can be released for beneficial uses later in the summer.

The reservoir will

• Left: Project Manager Earl M. Jannett, J. J. Thomas, Corps of Engineers, and Norman Holt of the Sanger, Calif., Chamber of Commerce.

• Now $200,000 bridge was braced with rip rap but washed out by record November flood in spite of precaution. Truck backs into stream to dump load while Caterpillar D8 operator adjusts winch cable.





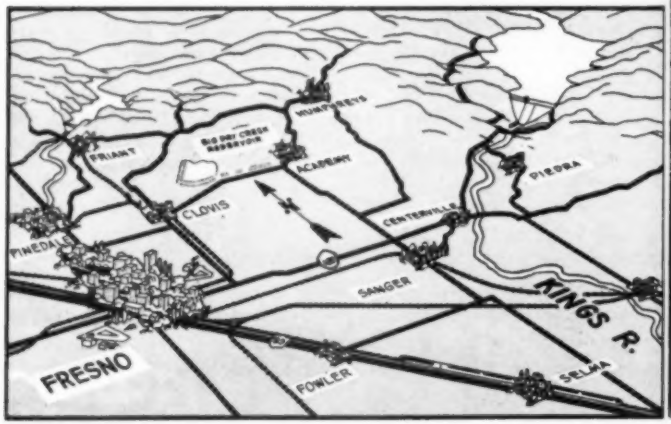
• Views show abutment section at left and spillway section above. The spillway section will have a curved crest at lower elevation than the top of the abutment section, allowing water to pass over the dam when spillway gates are open.

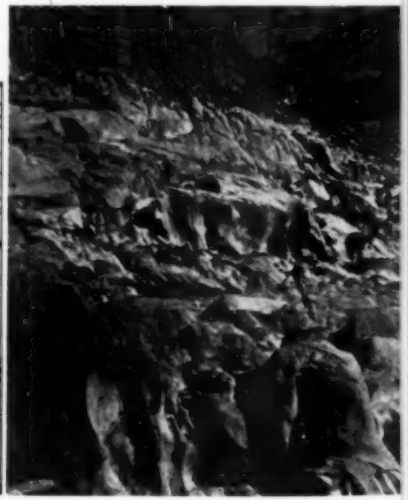
be operated for the benefit of irrigation and flood control. Three 13.5-ft. ID power penstocks are to be placed under the present contract to take care of future power development. Undoubtedly, too, the lake behind the dam will furnish incalculable recreation benefits for future generations.

Pine Flat Dam will rank among the eight highest concrete dams in the world, and will be one of the highest the Corps of Engineers has ever designed. Standing 440 feet high from bedrock to the top of its 32-ft. crest, the 1,820-ft. long barrier will be an imposing piece of work.

At its thickest point near the base, Pine Flat Dam will be 350 feet through. It will consist of a series of adjoining concrete blocks, or monoliths, 50 feet long and built in 5-ft. lifts. Ten special formed sluiceways, 5 x 9 in size, will pass the normal outlet flow through gated openings, and pre-established water requirements of Kings Valley farmers will be delivered over a concrete weir downstream from the dam. This weir was built into a

• Easily accessible over several good routes, Pine Flat Dam is located just 27 miles east of Fresno, Calif.





permanent bridge substructure a year ago, but it was ruined by the floods and will have to be rebuilt.

In addition to the sluiceways and power penstocks, a big 292-ft. spillway section is included in the design. It will have a controllable crest, made possible by six radial gates 42 x 38 feet. When the spillway is in operation, the reservoir will be about 19 miles long, and will cover about 6,300 acres.

Pine Flat involves exceptional quantities of excavation. Abutment stripping was a sizable rock job in itself. Of special interest was the removal of 240,000 yards of granite and amphibolite to make a 460-ft. track on each side of the steep gorge where the cableway towers could travel, when concrete pouring started.

Over 2,185,000 yards of concrete will be placed in the dam, and the machines which dig and haul the vast amount of aggregates also have to dig about 25% more, in the form of oversize boulders, that cannot be used for concrete in the Pine Flat design.

It is necessary, in order to get a clear picture of the project, to consider its over-all layout. Seven miles downstream from the dam itself, near the town of Piedra, is the aggregate production site, where raw material for the concrete is produced. Extending eastward from that point up the river valley is a railroad track, which carries the material to the dam area.

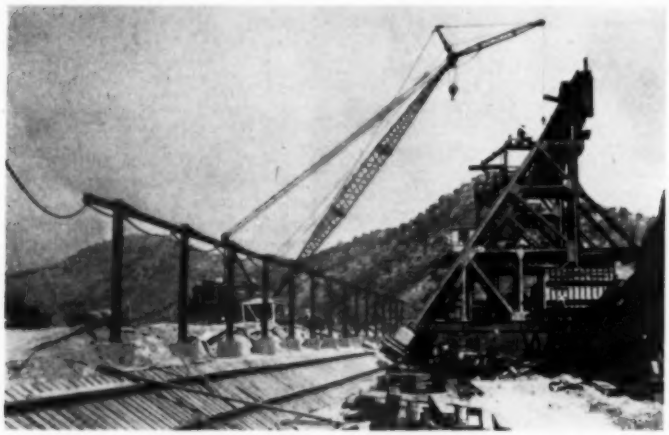
At the terminus of this railroad, which is about 4,000 feet below the dam, the contractors have a gravel washing-screening plant, a large storage area for equipment, dam gates and machinery and so on, and a large carpenter yard where concrete forms are made up. Roads lead from this area

• Bad breakthrough at the upstream earth and rock cofferdam had to be patched before the area could be cleaned up. Western and Euclid trucks dump quickly and a D-8 dozes the heavy material into the break.

• Fractured, seamy nature of the bedrock is apparent here. Cofferdam that failed is visible at left.

• Floodwaters left this tangled mess in the work area. The Northwest backhoe, which was almost trapped in the flood, removes material from the previously exposed bedrock.

• Cableway rock cut is fairly well opened up as wagon drills crowd in against toe to get slope clearance.



• Erecting structural sections of the cableways is a Bucyrus-Erie 54-B with 100-ft. boom and 15-ft. jib.

• A Bucyrus-Erie 120-B dragline loads raw material to three 30-yd. Western and Koppel cars drawn by a 44-ton General Electric locomotive.

up to the dam, and connect with the job office just below the dam. A 3,600-ft. conveyor belt leads up the mountainside to the cooling and batching plant, high on the south abutment.

The dam itself sets between two steep gorge walls, which pitch downward sharply to the 500-ft. stream bed. At the upper level of the dam, which is 970 feet above sea level, the excavation touches granite on the left abutment. The rest of the dam foundation is a highly fractured metamorphosed hornblend amphibolite.

Abutment and Foundation Stripping

Abutment and foundation stripping preceded concrete placement. There was Congressional pressure to get the work started, so in 1948 and 1949 two contracts were let to strip the abutments. H. Earl Parker, Marysville, Calif., got the right abutment, and Piombo Construction Co., Oakland, Calif., got the left abutment contract. The problems these two firms ran up against were the same as those Pine Flat Contractors faced when they started their work at the same location.

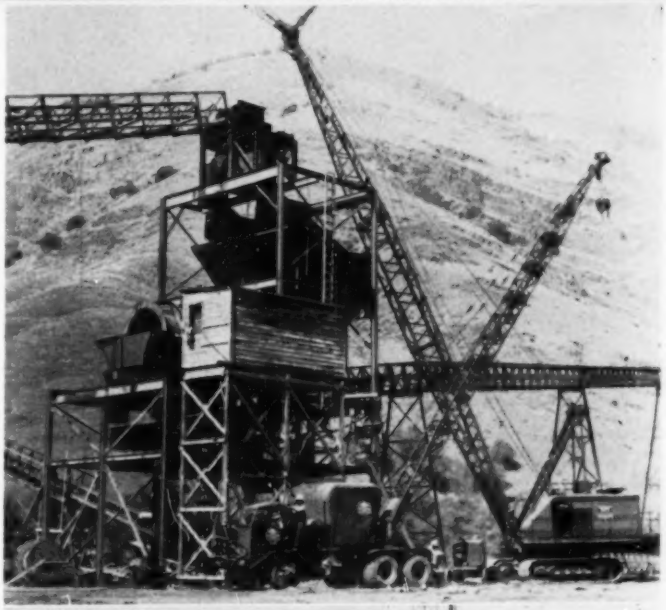
Excavation work by the prime contractor involved two 460-ft. long rock cuts for the cableway towers, and a general cleanup of the loose overburden material in the river bottom above bed rock level. The latter operation involved a 2-stage river diversion problem. In the first stage, a heavy timber wall on the riverward side trained the river over to the right, or north, abutment. Earth and rock cofferdams upriver and downriver, connecting the left abutment with the ends of the timber wall, permitted the first-stage area to be dewatered and construction started. Second-stage diversion calls for the river to be diverted through the permanent sluiceways, and earth-rock cofferdams upriver and downriver to the right abutment will prevent the encroachment of the river at that time.

It might be noted in passing that there exists always the possibility that the river can overtop any cofferdam, as it demonstrated last November and December.

Much Drilling Needed

Excavation began with the cableway cuts. Previous work by Piombo and Parker contracts had already established a few temporary access roads, but much road pioneering had to be done to get excavating equipment up to the cuts. Wherever possible, two Caterpillar D8's with bulldozers and

• The 30-yd. cars carry material to the aggregate plant and dump to the screening plant hopper.

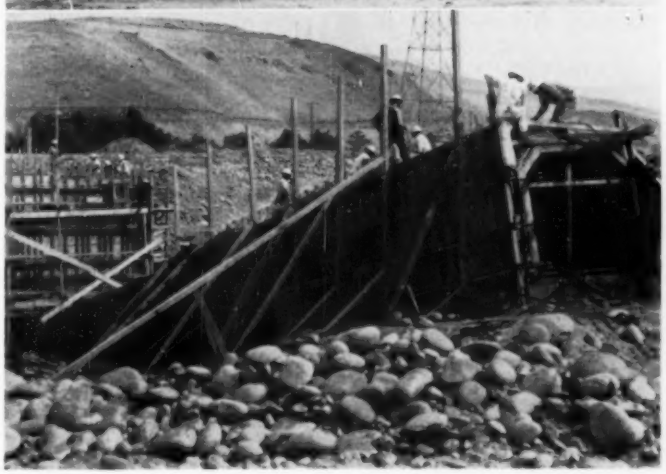


• Erecting the washing and screening plant near the dam are a Lorain Motocrane and the 54-B.

angledozers gouged out the initial road. The first drilling was also done. Pine Flat Contractors eventually were to place eleven 500-cu. ft. Gardner-Denver, Chicago Pneumatic, and Ingersoll-Rand air compressors on the two abutments, and the first of these machines arrived to power seven Ingersoll-Rand Jackhammers. Many shallow rock cuts were shot out as the access road was extended on a 7% grade, with numerous switchbacks, up each abutment.

When the access roads had been built, another Caterpillar D8 and bulldozer blade put in an appearance, and the three machines got busy leveling off the cableway cuts so wagon drills could go to work. This required only a narrow bench about six feet wide. Ten Gardner-Denver and four Ingersoll-Rand wagon drills then moved in and split up on both sides of the river. They started the major drilling by sinking 2½-in. drill holes on a designed center pattern of 3½ feet. Hole centers were naturally varied somewhat, according to the formation of rock, but in general the 3½-ft. centers were adhered to rather closely.

Drill steel in lengths to permit 15-ft. drill cuts carried the Ingersoll-Rand Carset drill bits. In some of the formations, particularly where amphibolite and diorite were found, drilling was extremely hard, and even the most modern tungsten carbide bits penetrated less than 10 feet before they had to be resharpened. In granite and other material less difficult, bits lasted well



• Wooden forms for one of the pressure grouting galleries get the finishing touches.

• Several test piles were included in the contract, and a pile-bent bridge will be built later. Here a Bucyrus-Erie 54-B handles the leads.

• A Bucyrus-Erie 22-B transit crane was used on a variety of jobs about the dam. Here it lifts the end of one of the railroad cars while a crew slips in a new set of wheels and trucks.

over 50 feet. Bit sharpening facilities were set up in the equipment repair shop near the contractor's office, and the Carset bits were ground twice during their service lifetime.

Column loading with Hercules 40% powder was practiced, and good breakage was the rule when 1¼ pounds of powder per cubic yard was used. Electric No. 6 blasting caps and a 220-volt power line detonated the charges.

Rock Very Abrasive

The cuts were loaded by three shovels: a Bucyrus-Erie 54-B with a 2½-yd. Esco dipper, and two 80-D Northwests with the same type dippers. Esco dipper teeth were used, and because the rock was highly abrasive, extensive hardfacing with acetylene-applied cast iron rod had to be done. Hauling equipment consisted of as high as three Sterling trucks, three Euclid and five Western custom-built trucks.

Rock disposal was no particular problem on the right abutment, because there was a convenient ravine on the downstream side of the cableway track. As the 15-ft. cuts were removed, the material was end dumped near the edge of the waste dump and a D8 bulldozer pushed it the remainder of the way. On the left abutment, the rock had to be wasted upstream from the dam, and above elevation 970, since the Corps of Engineers would not permit any rock to be dumped in the reservoir area. A short access road had to be constructed to meet this requirement.

The right-abutment cableway cut, at its deepest point, was a 75-ft. excavation. Before it was finished, engineers decided that to obtain a better foundation for the cableway tracks it was necessary to take off another 15-ft. slice on the same slope. The wagon drills again moved in, but because of the narrow bench they had to drill shallower cuts. There was hardly room for a shovel to work, so dozers had to shove most of the material off the edge to shovels down at the foot of the cut. It was a dangerous, confined operation, but it went off without a hitch.

The steep pitch of the left abutment made it necessary to extend that cut by 80 feet with a concrete and steel trestle to carry the cableway. Excavation work on the cableway cuts was a round-the-clock operation, with emphasis on drilling during the night shifts.

Cleanup of the river bottom inside the cofferdam area was a much safer,

• The flat concrete surfaces between 5-ft. pours have to be "roughed up"—cut or blasted with high-pressure water and wet sandblasting. In foreground, Ingersoll-Rand air pump draws off excess water.

• The first bucket of concrete goes into Pine Flat Dam. Notice that everybody on this project wears a hard hat.

less spectacular piece of work, but other than that, it was essentially the same. The base bedrock at Pine Flat Dam is badly fractured and broken, and dikes from 10 inches to 18 feet thick have intruded everywhere through the amphibolite. When the shovels and trucks had finished loading the rough material out, extensive hand cleaning, hydraulic sluicing, and some minor work with a dragshovel was also necessary. Every square foot of the bedrock has to be cleaned and inspected before concrete is placed.

The majority of the bedrock area had been cleaned and exposed, at great time and expense, and some concrete had been poured when tragedy struck.

On November 18, 1950, after a light rain had fallen all day, the weather station at Fresno became concerned and sent out a warning that Kings River might rise to its all-time November flow of 18,000 cubic feet per second. Snow packs lay at 3,000 feet. Men had worked most of the day removing wagon drills, power shovels, government and contractor's shacks. Concrete forms in place could not be removed. Air and water lines were in, and Layne-Bowler dewatering pumps continued to hum as they sucked the cofferdam area dry. Only about 30% of the bedrock area inside the cofferdam had been covered with concrete.

At 3:15, only 15 minutes after the river gauge had showed light flow, a call came to the office from the cofferdam area that a bad leak had started. Rock supporting the timber wall had started to fail, and welders were trying to reinforce the timbers. Observers high above on the cableway erection saw the river rise. "It looked like white stairsteps, getting higher and higher upriver," one man said.

The water was upon the welders before they realized it, and they abandoned their equipment and ran for safety. The Northwest 25 backhoe

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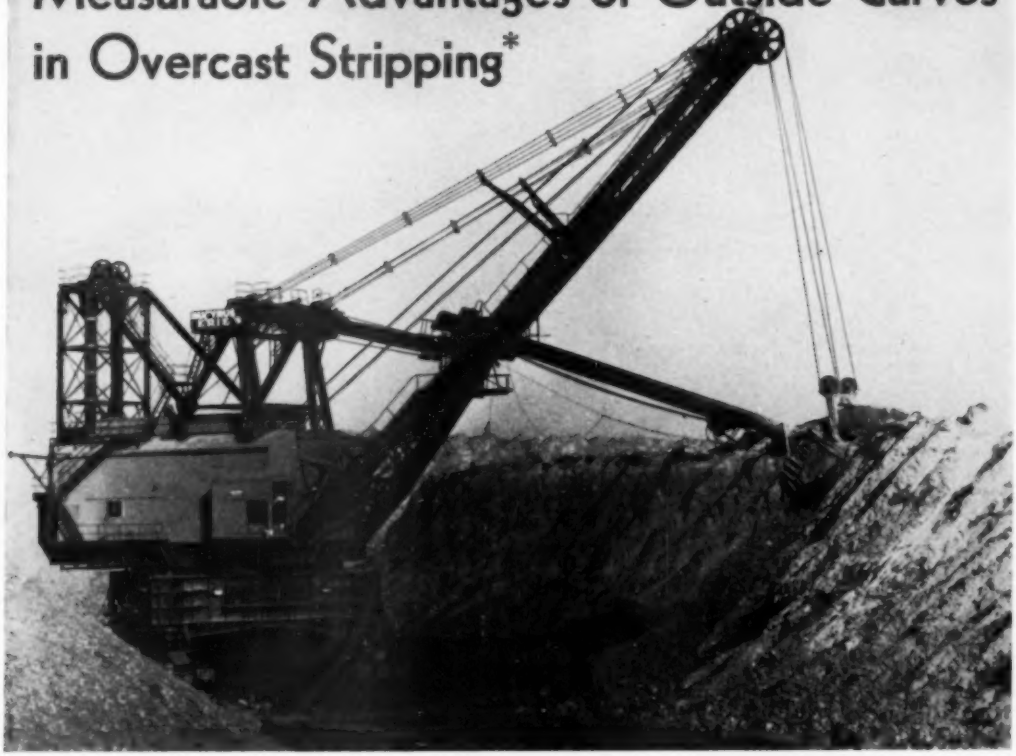
Measurable Advantages of Outside Curves in Overcast Stripping*



by
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and
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A method is described for reducing in overcast stripping the quantitative determination of the absolute gains derived from using outside curves of various radii to percentage values. A general method of approach is established which makes it possible to measure these gains with relatively minor alterations to fit specific cases. Pit sections and graphs are used to illustrate the general method. A specific illustration of pit layout employing outside curves in deep overburden is presented.

VERY probably all concerned with stripping operations using the overcasting method are aware of the benefits of employing outside curves in pit layouts. The basic advantage is that for any central angle of a circle, the sides of which intersect both stripping cut and spoil area, if the stripping cut is located closer to the center of the circle than the spoil area the distance along the arc of the sector of the stripping cut for this central angle is less than that along the arc of the adjacent spoil area.

This is known as an outside curve. For an inside curve, the positions of stripping cut and spoil area are reversed with reference to the center of the circle. In the outside curve, more spoil room is provided than in straight pits, and considerably more than on inside curves, where the lineal distance along the arc of the spoil area is less than that along the arc of the stripping cut, for the given conditions.

Granting that this awareness exists, to our knowledge no attempt has previously been made to evaluate even approximately the quantitative advan-

*Reprinted from the American Mining Congress 1950 Yearbook on Coal Mine Modernization.

tages of outside curves. In our experience it was found that under certain conditions of width of cut, thickness of coal, highwall and spoil slopes, and swell percentages, it was possible to increase the depth of overburden handled by the stripping equipment from 65 feet in a straightaway cut to 85 feet with a proper outside curve. This was sufficiently impressive to warrant undertaking this investigation.

At first it was felt that local conditions might vary so widely that no general scheme of evaluation could be reached which would be precise enough to be of broad interest. Further study showed, however, that a reasonably exact quantitative method could be established and made to fit a wide variety of conditions with only minor alterations to suit specific cases. The presentation of this method should emphasize to overcast stripping organizations the very real gains to be derived from proper use of outside curves.

This emphasis is essential because outside curves properly developed are seldom arrived at by chance and good fortune. The overcast stripping operation often inherits from its initial following of crop lines a tortuous pit layout representing an unhappy combination of inside with outside curves and straightaway cuts of varying lengths. Following this random pit layout into deeper overburden frequently leads to considerable distress because of lack of stripping range adequate to handle the conditions.

Inside curves occur in deep stripping, outside in shallow. A crop line box-cut should be straightened out as soon as possible, inside curves eliminated, and suitable outside curves developed aimed at the areas of deep stripping lying ahead. The initiation and continuation of suitable outside curves usually involves feathering cuts, narrowing and widening of the pit, and short pits for a time. These require planning and forethought, suitable machine maneuvering, and a thorough knowledge of the property.

It is felt that the quantitative advantages of outside curves in deep stripping are sufficiently valuable to warrant the extra effort necessary to develop them.

Explanation of the Method

Fundamental to the entire study is the fact that for any sector of a circle with a given central angle, the length of arc is directly proportional to the radius. Increasing the radius increases the length of arc for this given sector accordingly; decreasing the radius correspondingly decreases the length of arc. This may be expressed as:

S (length of arc) = R (radius)
⊙ (constant central angle)

The centers of gravity of the stripping cut and the spoil pile derived from it are selected as the only suitable reference points for measuring for the given sector the lengths of arc associated with the stripping cut and the spoil pile, developed from an outside curve of fixed radius located at the toe of the highwall, or, as it may be called, the coal rib. These centers of gravity can most readily be located by graphic methods, principally by the intersections of diagonals.

In Pit Section No. 1 the cross-sectional view shows the locations of the centers of gravity of both stripping cut and spoil pile with reference to the coal rib. The horizontal distances, or moments, of these centers of gravity relative to the coal rib, are 49.38 feet

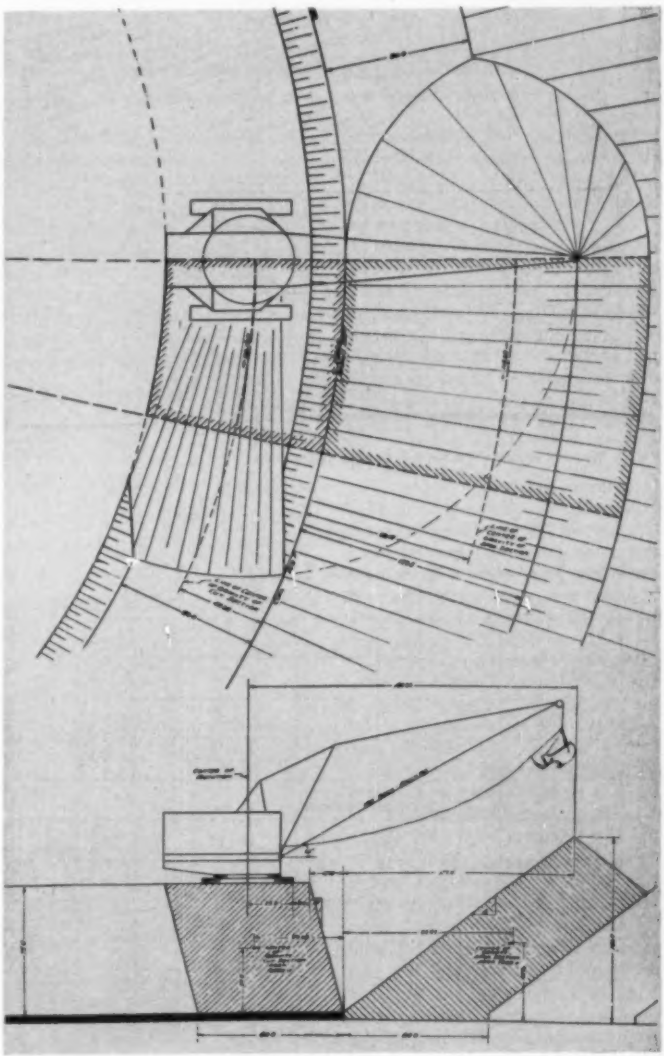


Fig. 1. Plan and section of Pit No. 1 — Maumee Collieries Co.

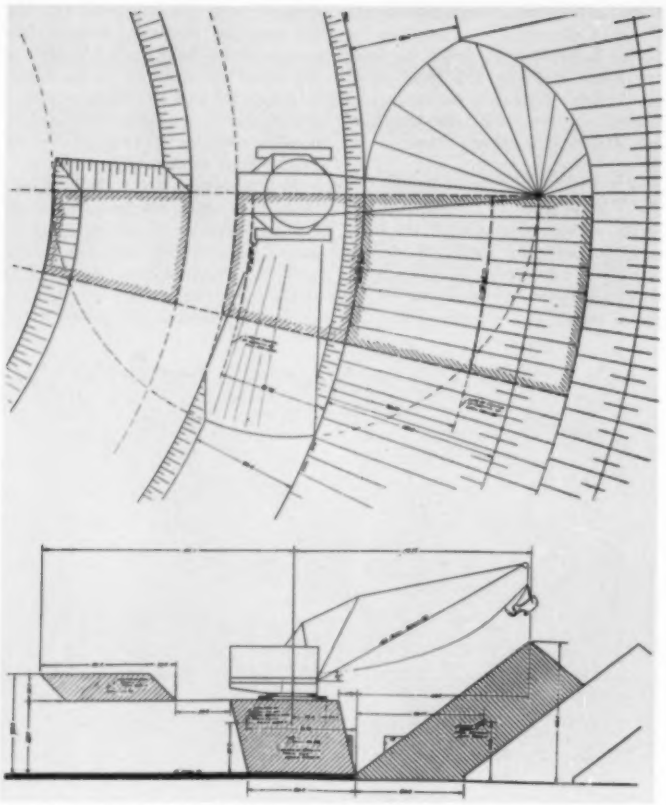
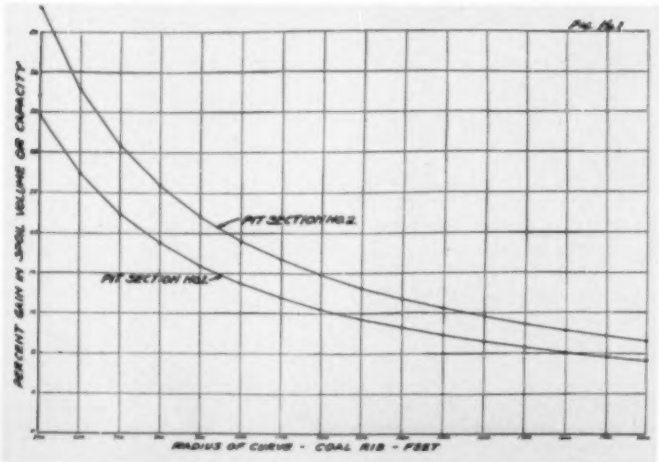


Fig. 2. Plan and section of Pit No. 2 — Maumee Collieries Co.

Fig. 3. Gain in spoil volume in Pits No. 1 and No. 2.



for the stripping cut and 93.47 feet for the spoil area. This relationship is, then 49.38 to 93.47.

This basic relationship holds good for the cross-section as to the radii of the respective centers of gravity related to the radius of the outside curve at the coal rib. Our fundamental concept, to repeat, is:

$$S = R \odot$$

In straightaway stripping the radius is infinity, and the constant central angle is zero, as is the length of arc. The equation has no practical significance. With the introduction of curvature along the coal rib, the relations of the moments of these centers of gravity to the coal rib become significant.

In Pit Section No. 1, the given sector is shown in plan, the radius of the outside curve on the coal rib being 500 feet, and the arc of the coal rib curve in the given sector taken as 100 feet. Instead of the angular measurement for the sector, the length of arc corresponding to this sector on the outside curve at the coal rib is used, these being directly related. The lengths of arc through the centers of gravity of stripping cut and spoil pile are arrived at as follows:

Stripping cut

$$500 - 49.38 = 450.62$$

$$\frac{450.62 \times 100}{500} = 90.12$$

Spoil pile area

$$500 + 93.47 = 593.47$$

$$\frac{593.47 \times 100}{500} = 118.69$$

The advantage to be gained by using an outside curve of this radius at the coal rib under these conditions is, then,

$$\frac{118.69}{90.12} = 1.31700 \text{ or } 31.7\%$$

The same arithmetical procedure may be used to determine the advantage of outside curves on the coal rib of any selected radii. Fundamentally, the determination of the horizontal moments of the centers of gravity of stripping cut and spoil area to the coal rib along which the outside curve is laid out is essential.

Formula Applied to a Bench Cut

Pit Section No. 2 is similar to Pit Section No. 1, except that a bench cut is taken, altering the location of the composite center of gravity of stripping cut and bench cut with respect to the coal rib as compared to the center of gravity of the stripping cut

alone as in Pit Section No. 1. Of course, the horizontal moment of the center of gravity of the spoil area with respect to the coal rib remains unchanged. The centers of gravity of stripping cut and bench cut are located by intersections of diagonals. The composite center of gravity will be located along a line connecting these two centers of gravity at a distance from the stripping cut center of gravity inversely proportional to the relationship of the stripping cut cross-sectional area to the bench cut cross-sectional area.

The horizontal moment of the composite center of gravity of stripping cut and bench cut from the coal rib is 81.78 feet, and of the spoil area center of gravity from the coal rib 93.47 feet, with a coal rib radius of curvature of 500 feet, and a 100-ft. arc along the coal rib.

The length of arc through the composite center of gravity for stripping cut and bench cut is

$$500 - 81.78 = 418.22$$

$$\frac{418.22 \times 100}{500} = 83.64$$

Spoil pile area

$$500 + 93.47 = 593.47$$

$$\frac{593.47 \times 100}{500} = 118.69$$

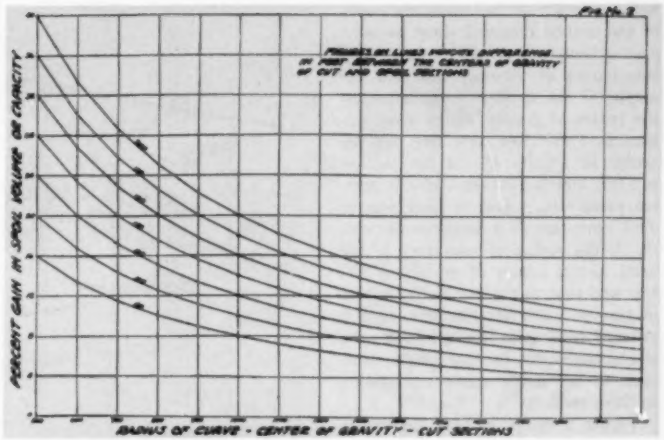


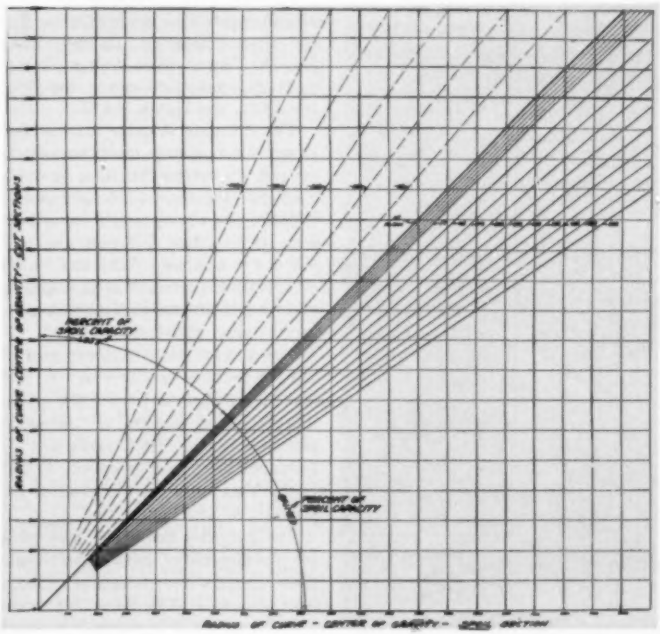
Fig. 4. Graph showing theoretical gains in spoil volume by curves of various radii.

The advantage of the outside curve under these conditions is

$$\frac{118.69}{83.64} = 1.4190 \text{ or } 41.9\%$$

This indicates the advantage of a bench cut from the standpoint of gaining spoil room on outside curves. The advantage is derived from the location of the bench cut closer to the center of the circle; the bench cut occupies a smaller area in plan in the given sector, and the total volume of material taken from combined stripping cut and bench cut is less than in Pit Section No. 1, where the total volume comes from the stripping cut alone.

Fig. 5. Graph showing percentages of spoil area gained on outside curves and lost on inside curves.



Various Advantages Discussed

Figure No. 3 shows the per cent gain in spoil volume, arrived at as above, for these two pit sections, and for various radii of curvature from the center to the coal rib. It may be surprising to many to note that even for the long radii the gain in spoil area amounts to about 8% for Pit Section No. 1 and to about 10% for Pit Section No. 2.

Figure No. 4 has been constructed to illustrate generally the advantages gained in spoil area at varying distances between the centers of gravity of stripping cut and spoil area when these are related to various radii of curvature to the center of gravity of the stripping cut sections. It is of broader application than Figure No. 1 because not based upon the relations of centers of gravity of stripping cut and spoil sections to the coal rib—these will vary with each pit section. It emphasizes the inter-relationship between wide cuts and short radii of curvature in obtaining the maximum benefits from outside curves.

Figure No. 5 is a general graph showing percentages of spoil area gained on outside curves and lost on inside curves for different radii of curvature of both stripping cut sections and spoil sections. All curves to the left of the heavy central diagonal curve represent percentages of spoil capacity lost due to inside curves at

various radii; all curves to the right of the central diagonal show percentages of spoil area gained by use of outside curves of various radii. For example, if the radius of curvature to the center of gravity of the spoil section is 1,200 feet and that to the center of gravity of the cut section is 1,000 feet, an outside curve is present permitting a gain in spoil area of 20% over that in a straightaway cut. Or, if the radius of curvature to the spoil section center of gravity is 900 feet and that to the cut section center of gravity 1,000 feet, the spoil area is reduced 10% from that available on a straightaway cut because of the presence of an inside curve conforming to these radii.

Figure 6 shows in plan the trends of the stripping cuts at No. 28 mine of The Maumee Collieries Co. near Jasonville, Ind., together with overburden depths, old works, and former stripping. It will be noted that the radii of curvature of the outside curves decrease in the heavier stripping, and that the pit trends become more sharply acute in the deeper overburden.

With the stripping equipment now on the property it is expected to handle successfully somewhat over 90 feet of overburden by proper development and employment of outside curves; without these, stripping operations would be terminated in approximately 65 feet of overburden in straightaway cuts. This should emphasize the tremendous value of outside curves in pit layout under these conditions, and also indicate the sort of preliminary work necessary to establish these outside curves.

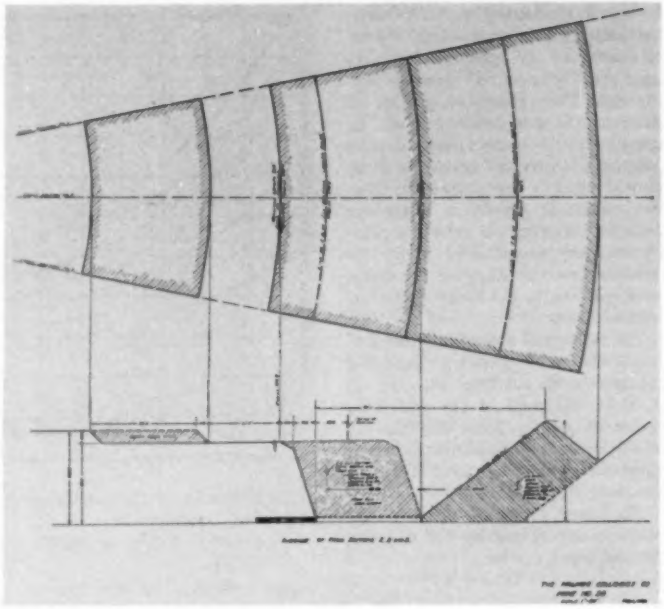
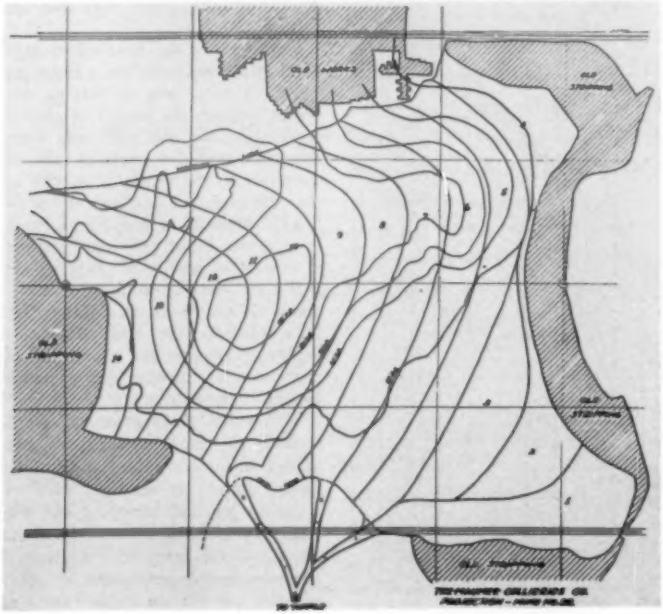


Fig. 7. Cross-section of Pit in Mine No. 28 — Maumee Collieries Co.

Fig. 6. Plan of Mine No. 28 of Maumee Collieries Co. showing sequence of stripping cuts.



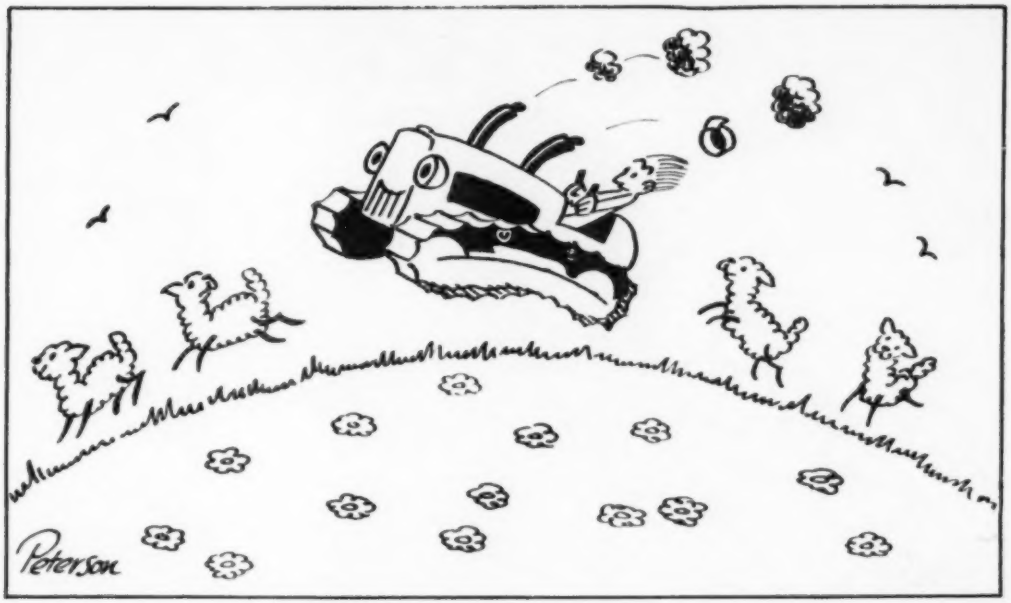
To provide a check on this method of determining the advantages of outside curves in overcasting, precise field measurements were made of three typical cross-sections at Maumee Mine No. 28. Two of these limit a pit segment on an outside curve; the third bisects it. See Figure No. 7.

The stripping dragline used at this property can dispose of approximately 60 feet of overburden in a straightaway pit. The accompanying figure illustrates the actual conditions in plan and cross-section, following the outside curve as shown. With this radius of curvature the machine is disposing of 76.8 feet of overburden as an average in these cross-sections.

The average cross-sectional area of the cut sections is 7,065 sq. ft., and that of the spoil sections 6,410 sq. ft. The indicated segment of the stripping cut contains 56,530 yards, and the corresponding spoil segment 67,060 yards. This measures the swell of the material as 18.63%.

The proposed method of measuring the outside curve advantages would show a benefit over straightaway stripping cuts of 30.7%, since the radius

Continued on page 63



Spring Tonic for Tractors

By Fred O. Schreck*

THE best spring tonic for tractors is a little preventive maintenance to insure high output during the torrid summer months ahead. Here are a few steps which if undertaken now will save repair dollars and down time later on.

Engine lubrication is the logical place to start, old oil, which is dirty and diluted by cold-weather starting, should be changed to recommended summer grade. It is important to drain old oil from a hot engine.

Another major step that should be done without fail is draining and flushing the cooling system. It is a good idea, after draining the anti-freeze, to fill the system with a solution of from 5 to 10 pounds of ordinary washing soda and water, depending on the size of the engine. Leave off the radiator fill cap and operate the engine until the water is hot. Then drain and flush with clean water. Refill with soft or rainwater, if possible, and the recommended amount of rust inhibitor.

Next check the water hose clamps for leakage and tighten where necessary. Another excellent check for leakage is this: Remove the fan belt so that the water pump will be inoperative. Fill the radiator to the top, leave off the radiator cap, and, while the engine is running, hit the throttle hard and watch for air bubbles. If bubbles appear, it's a good indication of leakage around the cylinder head gaskets.

While conditioning the cooling system, check and adjust fan belt tension. Inspect the fan for bent and loose blades and check the fan hub mounting capscrews for tightness. Clean the spaces between the radiator fins by blowing them out with an air hose or flushing them with a water hose. Many

Continued on page 63

● "Spring tonic treatment" for International TD-24 crawler completed right in the field. Here an operator (lower left) works on the track assembly. The man on top checks lubricant in final drive assembly. Service truck stands by.

*Supervisor of Service, Industrial Power, International Harvester Co.

• After forming cradle for pipe, motor grader smooths right-of-way for ditcher and trucks which string pipe beside trench.

• Left: Specially-built ditch digger is basically a Buckeye equipped with Austin rotors.

Modified Ditcher Digs Wide Trench

LAYING-IN approximately 500 feet of 78-in. steel-reinforced concrete pipe per 8-hour day on an 8.5-mile stretch of auxiliary line for the San Francisco Water Department, near Mission San Jose, Calif., is the job of United Concrete Pipe Corp., Baldwin Park, Calif.

The steel-reinforced pipe, which has walls 7½ inches thick to give it an outside diameter of 93 inches, is being laid in 18-ft. sections weighing approximately 20 tons per section.

The trench for this giant pipeline averages 10 feet wide and 11 feet deep, and a specially-built ditch digger chalked up approximately 350 feet daily through black clay, gravel and some rock, working a 7-day week to keep ahead of the pipelaying crew. The contractor-assembled rig is basically a Buckeye but with Austin rotors. Power comes from a Caterpillar D8 tractor engine.

A No. 12 motor grader works ahead of the ditcher, making a temporary road for the digger and the truck and trailer combinations which bring up the pipe, and in gouging out a "cradle" into which the pipe is placed preparatory to lowering-in.

A mobile crane, powered by a Murphy diesel engine, lowers the pipe and a truck-mounted portable unit is used for backfilling operations.

Two D8 tractors, both equipped with bulldozers and one pulling a ripper, are used to help move the pipelaying crane in the hilly terrain through which the line runs; to assist in backfilling; to haul special sections of pipe to specific locations; and to rip and doze and assist a Northwest dragline through rocky sections ahead of the ditch digging machine.

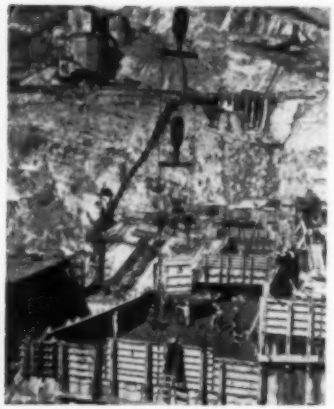
The auxiliary line will extend from the Irvington Portal of the Coast Range Tunnel of the Hetch Hetchy aqueduct near Irvington, Calif., to the Pulgas Tunnel near Redwood City, Calif. It will hook into existing lines from the Hetch Hetchy Reservoir high in the Sierra Nevadas, skirt the south-

Continued on page 56

• Caterpillar D8 with ripper and Northwest dragline clean out rocky and hard-to-reach sections. Crew works seven days a week to keep ahead of pipelayers on 8½-mile line near Mission San Jose, Calif.

• The big trencher digs 350 feet of ditch, 10 feet wide and 11 feet deep per day on United Concrete Pipe Corp. job for San Francisco Water Dept. The steel-reinforced pipe is 7½ inches thick with an outside diameter of 93 inches; sections are 18 feet long and weigh 20 tons.

News from the Field



HH Dam After New Record

With placement of the first 1951 bucket of concrete (shown above), a record season began at Hungry Horse. During this construction period approximately 1,200,000 yards of concrete are scheduled to go into the dam and power plant on the south fork of Montana's Flathead River.

Because the profile of the valley is especially suited for cableways, these tools are being used for evacuation, for handling concrete buckets, and for placing of machinery. Four cableways are being used: A new cableway constructed by the Washington Iron Works, Seattle, Wash. and two cableways built by Lidgerwood Industries, Inc., Elizabeth, N. J., which also served in the building of Shasta Dam in California. These are with G-E adjustable-voltage drive. The fourth ac driven cableway served in the construction of the Ross Dam in Washington.

The new adjustable-voltage drive used for the Hungry Horse cableway is of the Ward Leonard type. The armature of the dc hoist motor is electrically connected to the armature of the dc generator, which is direct-driven by a synchronous motor.

The generator output may be varied from zero to maximum in either polarity to respond to the load requirements. The speed of the motor follows the voltage and the direction of rotation agrees with the polarity. Field weakening is provided for obtaining faster speeds when handling an empty bucket. Approximate hoist rope speeds for the load buckets are 1,450 fpm with the empty bucket being rated at 1,750 fpm. Approximate carriage rope speed is 1,200 fpm which makes these cableways among the fastest in use. A G-E motor-generator set supplies dc power for the cableway motor. It will consist of one 500-hp synchronous drive motor, one 300-kw dc shunt-wound generator, and a 20-kw exciter.

The Grafe-Shirley-Lane Co., Los Angeles, Calif., on a $1,792,782.30 contract will install four giant 105,000-hp turbines that will harness the river for production of 285,000 kilowatts of hydroelectric power.

In addition to turbine installation, this contract will cover installation of transformers and all electrical equipment, except the generators, in the powerhouse; installation of heating and ventilating equipment, pumps, fire protection equipment and elevators in the dam and power plant; installation of equipment in the high-voltage switchyard to be constructed downstream from the dam; laying of bonded concrete floors, and completion of all ar-

• Getting things underway at Hungry Horse, everyone is out to make a record concrete pour this year. View from top of headway shows the lines that are scheduled to deliver 1,200,000 yards of concrete this season.

R. S. Wilson, Sr.

Rutherford Snow Wilson, Sr., well-known Little Rock, Ark., industrialist, died at a Little Rock hospital on February 6, after a week's illness. He was 74.

Mr. Wilson was executive director of the Big Rock Stone and and Material Division of the Minnesota Mining and Manufacturing Co. He had been president of the Big Rock Stone and Material Co. for 23 years before its sale last summer.

Mr. Wilson, a life-long fancier of horses, came to Little Rock in 1900. He had heard that drivers were needed for the horse-drawn street cars and came here to apply for a job. He later entered the contracting business and was an independent contractor for several years before purchasing an interest in the Big Rock firm in 1926.

Mr. Wilson was born at Columbus, Kan., Christmas Day, 1876.

He was a member of the Scottish Rite and York Rite branches of Masonry, a member of the Albert Pike Consistory, the Elks, Rotary Club, and the Chamber of Commerce. He had been a member of the Scimitar Shrine since 1904.

Survivors are a son, R. Snow Wilson, Jr., of Little Rock; a daughter, Mrs. E. C. Wilburn of Memphis; six sisters; four grandchildren and four great-grandchildren.

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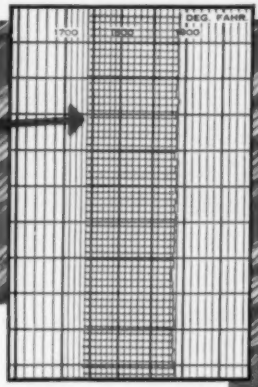

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chitectural finish work on the dam and powerhouse.

Other major work scheduled this summer will include clearing operations in the 23,500-acre reservoir area, which probably will be completed this year — more than one year ahead of schedule — and start of construction on a 47-mile long forest service road on the west side of the reservoir.

By the end of the 1951 construction season, the dam will be high enough to start storage of water in the 34-mile long Hungry Horse reservoir, and present plans call for closure of the 36-ft. diameter, 1,180-ft. long diversion tunnel next winter or early spring.

Reinhold ARBA President

In Milwaukee, March 12, Paul B. Reinhold, president, Atlas Equipment Corp., Pittsburgh, Pa., was elected president of the American Road Builders Association succeeding Col. Enoch R. Needles, New York consulting engineer.

Serving with Mr. Reinhold as district vice-presidents will be Charles M. Noble, chief engineer, New Jersey Turnpike Authority, Trenton, N. J., northeastern; Charles W. Smith, president, Smith Engineering and Construction Co., Pensacola, Fla., southern; W. A. Roberts, president, Allis-Chalmers Mfg. Co., Milwaukee, Wis., central; and A. Diefendorf, head, Dept of Civil Engineering, University of Utah, Salt Lake City, Utah, western. Jennings Randolph, assistant to the president of Capital Airlines, Inc., Washington, D. C., and former West Virginia Congressman, was renamed treasurer.

Falcon Dam Underway

The $77 million Falcon Dam, located 75 miles south of Laredo, at Falcon, Texas, is off to a good start.

Contracts were let in October, 1950, to a joint venture of seven contractors. They are C. F. Lytle, Sioux City, Iowa, prime contractor; Sam Ore Construction Co., McPherson, Kans.; Amis Construction Co., Oklahoma City; Foley Bros. Inc., St. Paul, Minn.; Massman Construction Co., Kansas City; Tellepsen Construction Co., Houston, Texas; and, F. G. Peterson Co., Omaha, Nebr. Actual work began in the first week of January, 1951. Philip Royer is general superintendent.

The dam will be of the earth-fill type, 150 feet high at the maximum fill and only 106 feet short of five miles in length. More than 30 million yards of earth will be placed for the dam.

Continued on page 34

Lionel D. Llewellyn

Lionel D. Llewellyn, 67, president of the Llewellyn Machinery Corp., Miami, Fla., died on February 23 in a Coral Gables hospital. He had been under medical observation for three weeks and underwent an operation on the day before his death.

Besides being head of the prominent equipment firm, Mr. Llewellyn was well-known as a member of the county budget board, a position he held since 1946, and as a pioneer surveyor of Greater Miami. He lived at 5900 Miller Rd.—a street he had named for the owner of acreage he surveyed in the early days when he was laying out what today are fabulous sections of Miami.

Mr. Llewellyn was a native of Johnstown, Pa., and came to Miami in 1908 under contract with the city to re-stake the boundaries of the then-young municipality. This work done, he elected to stay in Miami to survey and map some of the area's earliest subdivisions. Among other jobs, he sketched the plans which were to blossom into the city of Coral Gables.

In 1910 he founded the Llewellyn Machinery Corp. to distribute contractors' equipment and road machinery as something of a sideline to his surveying business. But as the area grew, the company became his principal enterprise.

An only son, James L. Llewellyn, is vice president of the company.

Mr. Llewellyn was an honorary life member of the Elks, a charter member of the Associated Equipment Distributors, vice president of the Century Club, a member of the Miami Rotary Club, the South Miami Riding Club, the Variety Club, the University of Miami Advisory Board, the Miami Chamber of Commerce, and an honorary member of the Miami Police Benevolent Association.

He was one of the founders of the Variety Children's Hospital.

Besides his son, Mr. Llewellyn is survived by his wife, Mrs. Rose Marie Llewellyn, two brothers and one grandchild.

• Compacting fill at the eastern end of Falcon Dam on the American side of the river, two International TD-24 tractors haul 40,000-lb. tamping rollers.

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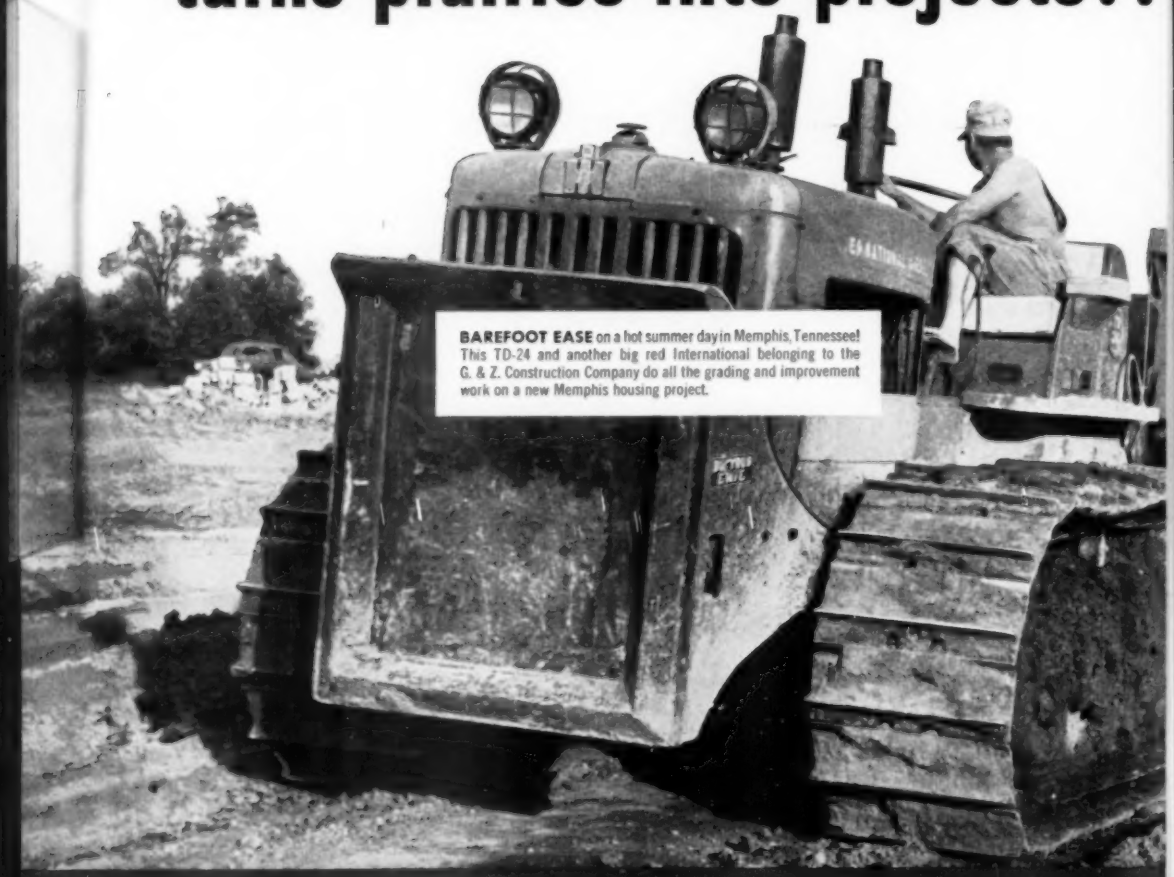

BAREFOOT EASE on a hot summer day in Memphis, Tennessee! This TD-24 and another big red International belonging to the G. & Z. Construction Company do all the grading and improvement work on a new Memphis housing project.

TD 24

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- **Exclusive International push-button, all-weather starting.**
- **Planet Power steering—with finger-tip control for pivot turns, feathered turns, turns with power on both tracks plus instant shift up or down one gear without declutching.**
- **Reserve torque overcomes overloads, increases drawbar pull for bigger scraper and bulldozer loads.**

Contractors, operators, men who know performance are passing the word around. They're telling each other how the TD-24 does more work more easily, in less time, than any other crawler on the market.

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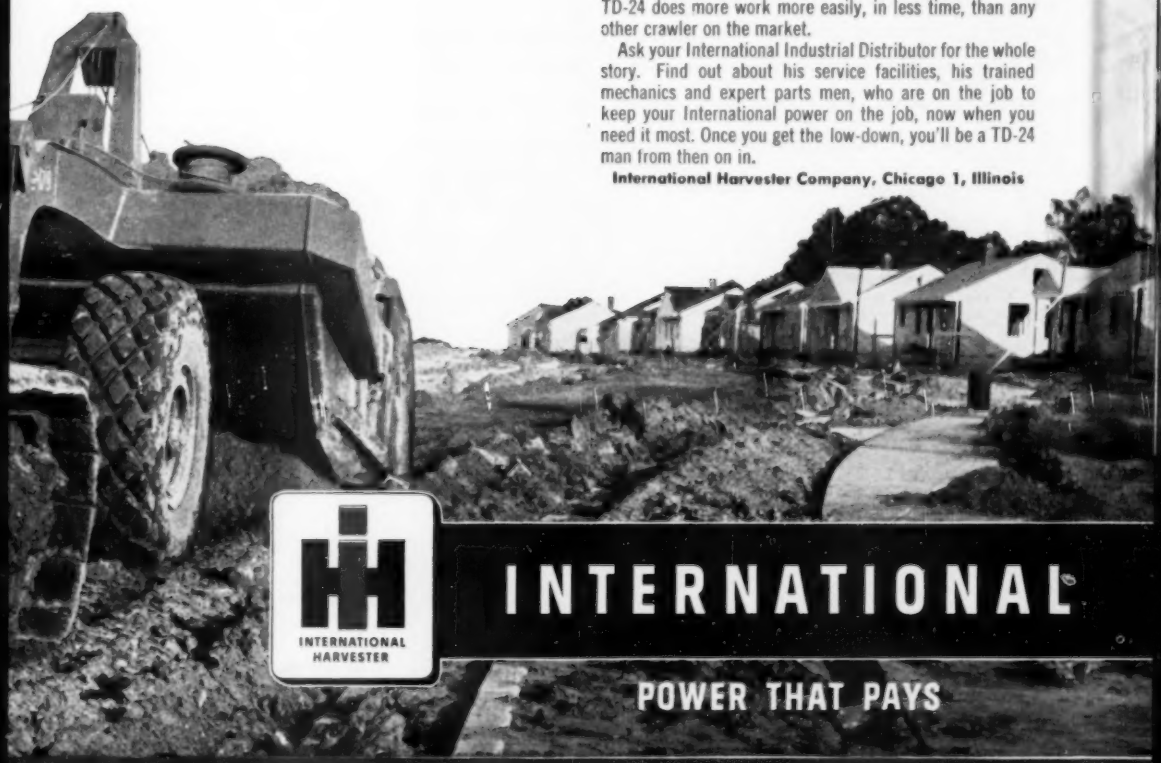

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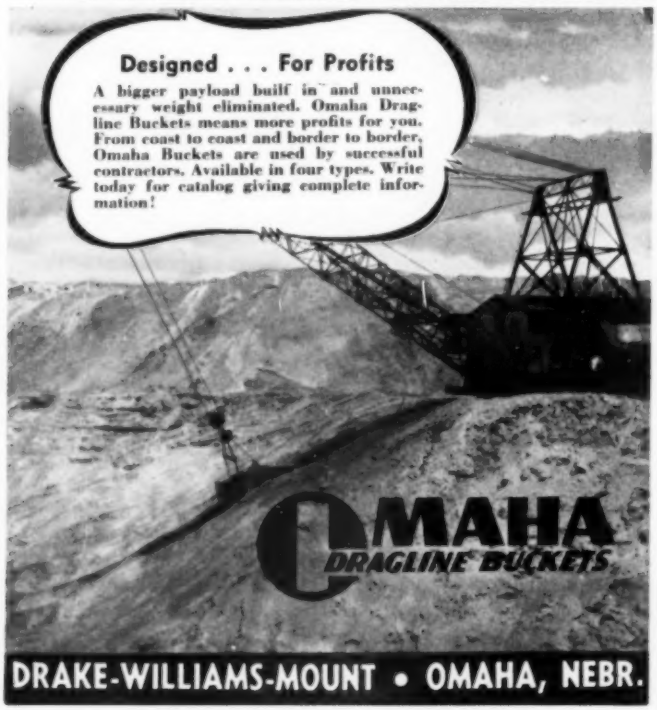
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News

Continued from page 30

Only the spillway will be of concrete construction.

Primary purpose of the structure will be irrigation of Mexican and U. S. soil along with hydro-electric development and flood control. Seasonal high river levels are counted on to fill the 4 million acre-foot-capacity reservoir. Power houses at both Mexican and U. S. ends of the dam will divide the power output between the two countries.

APWA Meets in Detroit

More than 1,000 public works officials will meet in Detroit, Mich., from September 16 to 19, the American Public Works Association announced last month. During the four-day period, men who direct the nation's local public works will gather for the Public Works Congress and Equipment Show.

About 60 leading manufacturers of equipment and materials are expected to exhibit at the new Veterans Memorial Building where the conference will be held. First of the buildings to be completed in Detroit's planned civic center, the building was opened last June. A series of technical sessions will also attract the members.

India Builds Academy

Naval, air and ground forces of the government of India will have a new training institution when a National Defense Academy is expected to be completed in 1954 near Khadakvasla, 13 miles from the city of Poona.

Construction of the project is well

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• Ground leveling work and excavation for India's National Defense Academy is being done by Caterpillar DW10 tractors and No. 10 scrapers.

underway, having started in May 1949 when Prime Minister Pandit Jawaharlal Nehru laid the foundation stone of the Academy. Actual work completed to date is the building of the main road through the center of the site and the construction of followers' quarters.

The next item on the schedule is the erection of a huge Administrative Block which will be the nerve center of the entire Academy. Sometime in 1951 the construction of an air-strip for use by the Air Force branch of the Academy will be undertaken. Naval training will be carried out at nearby Khadakvasla Lake.

Proctor Nominated for ASCE Presidency

The Board of Direction of the American Society of Civil Engineers nominated Carlton S. Proctor for 1952 president at its Houston meeting. A member of the society since 1925, Mr. Proctor has served it with distinction in several important posts. He was director for district 1 from 1936 to 1938, and vice-president for zone 1 in 1948 and 1949, serving on the executive committee of the Board of Direction during part of his tenure in both offices.

Tests Made on Kosi Dam

A way of saving $10 million in the cost of what will be the world's highest dam, the proposed 785-ft. Kosi Dam on the Kosi River in India, has been worked out by the Bureau of Reclamation. After making the initial study, an opportunity was seen for substantial economies in the designs which will save the Indian Government some 900,000 yards of concrete that would have cost them approximately $10 million

The tests cost little more than half the $30,000 advanced by the Indian Government for the work, and a voucher for the return of the unused portion of the advance has been forwarded by the bureau for remittance through the Department of State. The total cost of the tests was considerably under the amount advanced for the studies because of the excellent assistance by the Indian trainees assigned to this work by their government.

The Kosi Dam, as planned by the Indian Government for construction in the southeastern corner of Nepal, a few miles from Darjeeling, would be 57 feet higher than Hoover Dam on the Colorado River near Las Vegas, Nev., now the world's highest.

The reservoir impounded by the dam would irrigate four million acres of land, an area larger than Connecticut and Rhode Island, which is expected to produce one million tons of new food supplies annually to meet the pressing needs of India's expanding population. In addition, elimination of present flood areas by construction of the dam would decrease the incidence of

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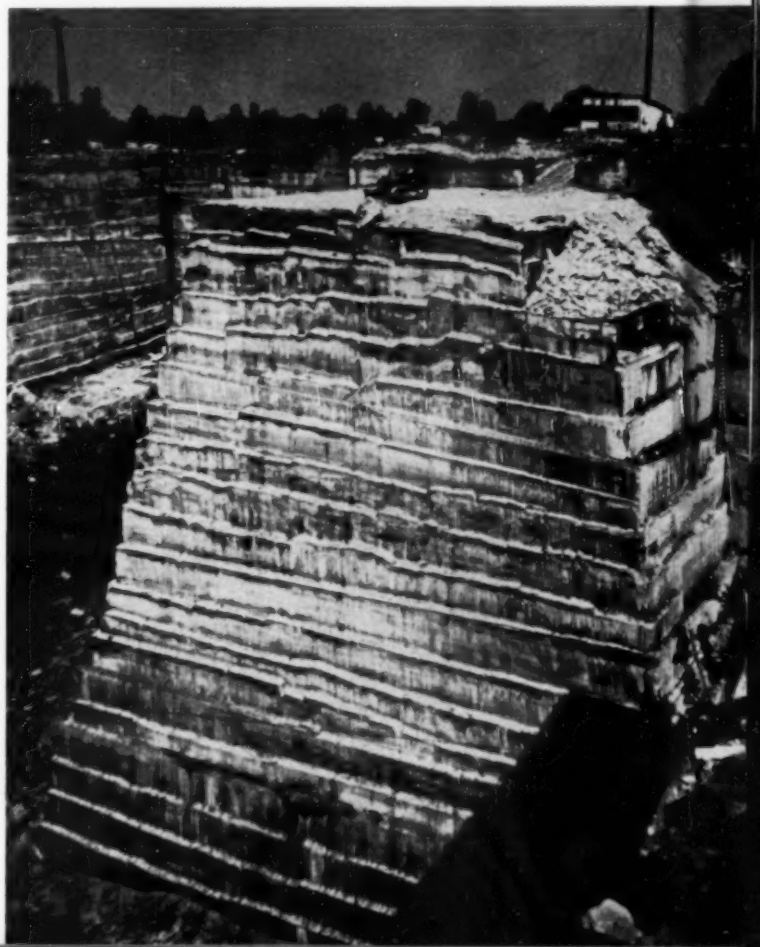

• Quarrying operations at Cleveland Quarries near South Amherst, Ohio, require a steady hand and a sure track. Here an International TD-9 equipped with Bucyrus-Erie Dozer-Shovel and blade attachment pushes a rock to the quarry floor, 250 feet below.

Measure by
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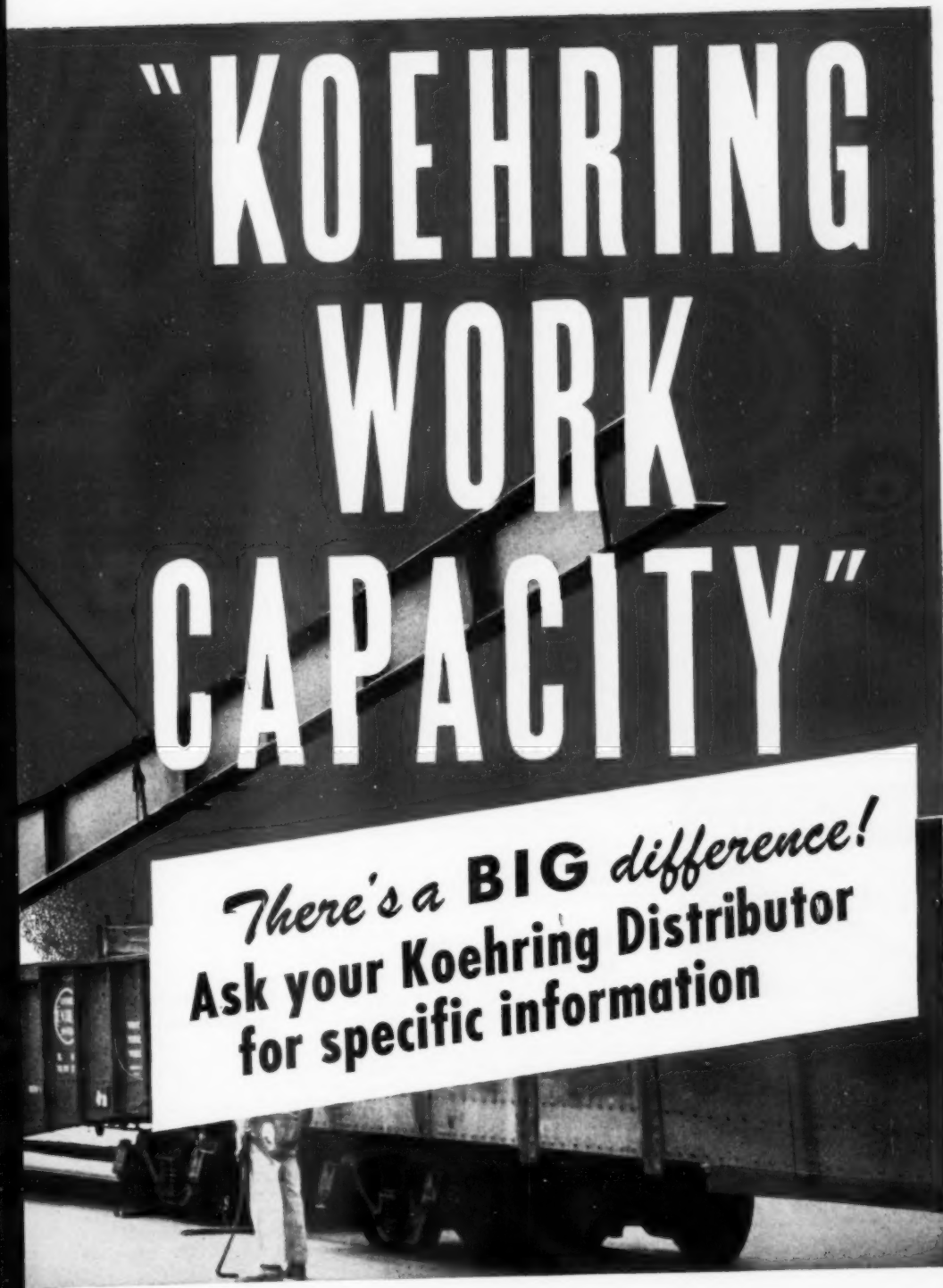
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Continued from page 35

malaria and other diseases in the region.

Unique engineering problems at Kosi are the danger of earthquakes and the unusual silt load of the river. Earthquakes have shaken the dam site on four recorded occasions; yet today, engineers accept this factor not as an obstacle but merely as one of the elements to be considered in designing the dam.

A normal silt rate for river basins in the United States is 75 acre-feet per 100 square miles of catchment; the rate at Kosi is 397 acre-feet, possibly the highest for any river basin in the world.

These and other engineering problems were considered in the tests and laboratory studies conducted at the bureau's engineering center. Under present plans, after preliminary work is completed, the Kosi irrigation system is expected to be finished within four years and the dam itself within 11 years.

Holland ICEI Chief

The Internal Combustion Engine Institute elected W. M. Holland, of the International Harvester Co., president at the organization's annual meeting and election of officers on February 15, 1951.

The Institute, formed in 1933, is an association of internal combustion engine manufacturers who sell their products for general use. Its sixteen manufacturer members include nearly every important producer of diesel, gasoline, and gas engines.

Other officers elected to serve with Holland are Vice President, G. W. Thomas, chief engineer, automotive division, Continental Motors Corp.; Secretary, J. E. Heuser, manager of engine sales, Le Roi Co.; Treasurer, J. F. Bachman, manager of industrial engine department, Ford Motor Co. Phil Norton, vice president-sales manager, Wisconsin Motor Corp., the retiring president of the Institute, will continue as a member of the board of directors. The executive offices of the I.C.E.I. are located at 201 North Wells St., Chicago 6, Ill. Charles G. Spice is executive secretary.

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Status of Penn., Ohio, Ind. Turnpikes

The projected $300 million toll turnpike across northern Ohio can't be completed before the fall or winter of 1953 according to official estimates. Meanwhile, the western terminus of the Pennsylvania Turnpike is scheduled for completion Nov. 1, when 7,000 vehicles a day will start pouring from it into Ohio.

The projected Ohio Turnpike will start south of Youngstown at Petersburg, run west across Ohio north of Akron, south of Cleveland, between Lorain and Elyria, just north of Fremont, Bowling Green, Wauseon and Bryan, and connect with U. S. route 20 in Indiana.

A bill authorizing the creation of a four-member State Toll Road Commission, with authority to issue revenue bonds for the construction of toll highways, was given final passage by the Indiana Legislature March 2 and sent to Governor Schricker for signature. This paves the way for Indiana to set up a turnpike authority.

Speed Railroad to Labrador Iron Ore

This spring will see the start of full-scale development of the 360-mile rail line into the big iron ore deposits on the Labrador-Quebec boundary. Into this railway will go an estimated $115-$120 millions of the $200 million investment planned for the iron ore project.

The tote road to carry men and supplies was built in the winter of 1949-50 and temporary docks were erected at Seven Islands last fall. Also half a mile of tract has been built from the docks into the storage sheds at the port.

An air strip has been built about 80 miles north of Seven Islands and materials and supplies are being flown in to this strip and to ice-covered lakes along the route so that work on the railway can get under way quickly this spring. Additional strips will be built. One of these is already under construction. Others will be added this summer.

The freight being carried by air includes heavy earth-moving equipment weighing as much as 20 tons. The machines are broken down into parts and then reassembled at the site.

Work on the railway itself so far has been confined to tunneling (about 14 miles north of Seven Islands) and taking out some heavy clay cuts on the first part of the line. A 600-man crew is at work on various parts of the project at the moment. When things really get going this spring, around 2,000-2,500 will be employed on the railway, with another 500 on the construction of permanent docks.

Toughest section is expected to be the first 100 miles north of the St. Lawrence; beyond that the going should be fairly easy right up to Burnt Creek camp. The railway construction schedule calls for completion in 1954, with ore shipments the following year.

Virginia Maps Toll Road

Plans have been announced by the Old Dominion Turnpike Corp. for the start of surveys of a route for a $50 million toll superhighway across southwest Virginia.

The plans were revealed after the corporation was granted a charter (February 20) by the Virginia State Corporation Commission. The charter was obtained after the Virginia State Highway Commission passed a resolution stating that the proposed construction would not be injurious to the existing state highway system.

The non-profit corporation will not be ready to talk finance for another 60 days. The proposed toll road would cross Bland, Wythe and Carroll counties.

London Engineering Exhibition

The largest display of engineering manufacturers in the world will once again be on view at the Engineering Marine and Welding Exhibition which will be held in London from August 30 to September 13, 1951.

This exhibition will be the center where buyers can make easy and direct contact with manufacturers of all types of engineering equipment and examine on the spot any of the thousands of exhibits collected together under one great roof.

Sgt. Robert Chrisman levels a field at the eastern end of the Davison airstrip, Ft. Belvoir, Va., with a "Cat" D7 Tractor. In the background are four "Cat" No. 12 Motor Graders completing runway.

THE MILITARY GETS FIRST CALL

THESE "Caterpillar" earthmoving machines, working on the runway of the Davison airstrip at Ft. Belvoir, Va., show at a glance where a lot of "Cat" equipment is going these days. And that's how it's got to be.

Defense Rated Orders get first call as America's military establishment prepares for what may come. The urgent build-up of our power has meant drafting machines as well as men. An ever-increasing flow of "Caterpillar" equipment and parts is going to the support of America's fighting men and to defense projects.

This means that there already exists a scarcity of "Cat" equipment and engines for civilian use. So it is to *your* advantage to make the machines you now have *last*. You can keep them on the job longer by doing these things:

1 Follow sound and recommended operation and maintenance procedures to the letter. Read and reread your Operator's Instruction Book.

2 Make full use of your "Caterpillar" dealer's facilities for servicing and rebuilding machine parts.

3 Anticipate future parts needs, then contact your dealer and let him help. But *don't* buy or order parts you don't actually need.

Caterpillar Tractor Co. will do everything possible to maintain every "Caterpillar" machine in the field, to provide new machines as fast as possible, and to allocate them as fairly as possible.

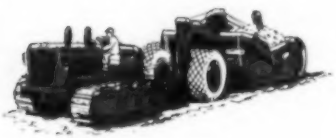
CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

SPEAKING OF FRONT ENDS...
The Dozer-Shovel gives you a real *Mouthful*



Earth-Moving Champion

The BIG RED TEAM

Get acquainted with a real earth-moving combination — the International TD-24 tractor and Bucyrus-Erie B-type scraper. The Big Red Team is setting new records from coast to coast.

WITH heaping mouthfuls of dirt on pass after pass, the Bucyrus-Erie Dozer-Shovel really puts the bite on your earth-moving costs. And there's no end to the jobs this versatile rig can handle. Available with either dozer blade or bucket front-end, it loads and stockpiles material, grades and levels, builds and maintains roads, excavates backfills, handles clean-up — dozens of digging, loading and lifting jobs.

Top-notch visibility makes it easy for the operator to level off sidewalls, clean out corners . . . swing his rig into the right spots for biggest loads.

Smooth, fast hydraulic control permits raising bucket to top height in 8 seconds — drop it in 4½ seconds — or lower at slow speeds under full control.

Two Dozer-Shovel sizes — ¾-yd. TD-6; 1-yd. TD-9. For complete details on money-saving Dozer-Shovels, see your INTERNATIONAL Industrial Tractor Distributor. 2207S1C

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

See Your INTERNATIONAL Industrial Tractor Distributor

Equipment You Ought to Know About

Improved Dump

Manufacturer: Kalamazoo Manufacturing Co., Kalamazoo, Mich.

Claims: The Kal-Truk can now be equipped with a dump control on the front end gate. This control door will allow easier pouring into small or narrow openings and is also desirable for discharging partial loads. The dump control is manually operated and may be opened or closed at any time. A front end gate embodying this new feature can be furnished for installation on trucks already in service.

Gas Weighing Device

Manufacturer: American-LaFrance-Foamite Corp., Elmira, N. Y.

Claims: Device for weighing carbon dioxide system cylinders without taking the system out of service. The operator is only required to loosen the clamp bolts holding the cylinder, insert the fulcrum under the neck of the valve, press hand lever until cylinder clears the floor, and read the scale for the weight.

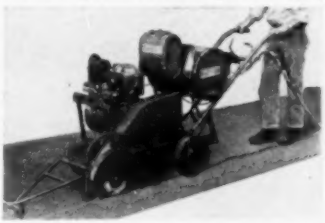
It is made of channel iron to give it added strength without weight, is well braced, and has a capacity for weighing up to 200 pounds.

Free illustrated literature is available upon request.

Concrete Saw

Manufacturer: Concrete Sawing Equipment, Inc., Pasadena 1, Calif.

Claims: Known as the model 51 self-propelled Concut, this machine is used for sawing concrete and asphalt streets,



concrete floors, airport runways, etc., prior to the breaking and removal of the material, thereby assuring a smooth, straight edge for patching. Other uses include sawing contraction joints, sawing for installation of expansion joints, grooving for crack control, grooving ramps and steps for safety, etc.

The self-propelled feature increases the life of the cutting blade and speeds the sawing operation. Other features include a dash panel showing water pressure gauge, spindle speed tachometer, motor throttle, cut-off switch and transmission control lever. The new lever lock control feature enables the operator to remove the blade from the cut, then lower it to the same depth without changing adjusting screw. The self-propelled Concut is powered by a 13.3-hp gasoline engine to provide ample power for toughest sawing and uphill operation.

Protective Coating

Manufacturer: Gates Engineering Co., Wilmington, Del.

Claims: Synthetic rubber can now be applied as an airdry protective coating for industrial maintenance work on structural steel, concrete, wood and exterior surfaces of tanks and equipment. It is applied by brush or spray gun in a single coat of 5-10 mils thickness. Outstanding properties distinguish neoprene from natural and other synthetic rubber — exceptional resistance to oil, grease and chemicals; resistance to age-cracking by sunlight, weather and ozone. It also possesses the characteristic properties of any rubber product—resilience, elasticity, high order of abrasion resistance, non-chipping and non-cracking.

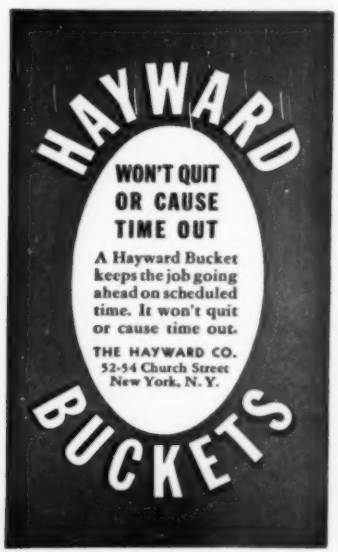
An outstanding feature of the coating is the fact that it develops its desirable physical properties without benefit of heat. It is a solvent solution of a specially developed neoprene composition—it will not gel or "set up" in the container.

Junction Box

Manufacturer: Stone Manufacturing Co., Elizabeth 4, N. J.

Claims: Heavy-duty weatherproof junction box made of non-corrosive,

Continued on page 46


HAYWARD
WON'T QUIT
OR CAUSE
TIME OUT
A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.
THE HAYWARD CO.
52-54 Church Street
New York, N. Y.
BUCKETS

3 TOURNAROCKERS *on Oregon*

Typical hourly: 12 yards of material on cliffside fill in 25 to 35 seconds. In addition to these 3 Tournarockers, the contractors' hauling fleet includes 14 Super C Tournapulls, 3 LeTourneau Wagons, and 10 Model W Carryall Scrapers.

Oversize, disc-type air brakes on all 4 wheels (4176 sq. in. total braking surface) let Tournarocker operators drive down narrow 30% grades with complete safety and confidence.

Lookout Point Dam will be completed across the Middle Fork of the Willamette River near Lowell, Oregon, in 1953. One section of work now in progress involves relocating 2 miles of State Highway 58 and 2 miles of Southern Pacific rail line above the reservoir area at Goodman Bluff. Approximately 1,236,000 cu. yds. of rock and 917,000 cu. yds. of common earth have to be moved... most of it from canyon slopes ranging from 1:1 to vertical. Leonard & Slate Oregon Ltd. and E. C. Hall Co. of Portland share the 2,153,000-yd., 18-month federal contract... and have assigned the most difficult hauling on it to 3 LeTourneau 16-ton, rear-dump Tournarockers. Here's typical performance:

Make 24 trips hourly on 3200′ cycles

On one section of the job, the Tournarockers have 400′ of one-way travel down 30% grade... 1000′ along existing highway through heavy traffic... and 200′ on the rough unfinished fill. The entire 0.3 mi. stretch is narrow and

Mail today to: **R. G. LeTOURNEAU, INC., Peoria, Illinois**

LeT

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

TYPE OF WORK _____

- ☐ Send us more information
- ☐ Have Distributor call regarding:
- ☐ 28 m.p.h., 9-ton Tournarocker
- ☐ 35 m.p.h., 18-ton Tournarocker
- ☐ 35 m.p.h., 35-ton Tournarocker

lick 30% grades Highway

Tournarocker turns ground within 13.9%, scats quickly under rock shovel. Ordinarily, each "C" is loaded with 12 pay yards of rock and clay overburden in 2½ to 3 minutes. Combined production for all 3 units averages 2400 yards per day.

Tournarocker—Trademark, Tournapull, Carryall—Trademark Reg. U.S. Pat. Off.

winding . . . there are some delays for traffic . . . and "elbow room" at both shovel and dump is severely limited . . . yet each "C" completes a 3200′ cycle every 7 minutes.

3 units move 288 yds. hourly

Average haul speed, including complete stops for one-way traffic, is 9.8 m.p.h. . . . and average shovel-load is 12 pay yards. In one hour, each Tournarocker makes 8 trips . . . delivers 96 pay yards. This time study figure checks closely with over-all job production records, which show that on similar hauls, with 2 Tournarockers handling output of one shovel, each LeTourneau rig has been averaging approximately 125 yards per hour.

Speed production during wet weather

One of the biggest problems on the Lookout Point job is the rainy season, which is usually 6 months long. Clay in the gravel-clay mixture is extremely slippery when wet, and makes a serious problem on the steep, narrow and winding haul roads. To meet these conditions, Tournarockers offer a number of distinct advantages. Their big 21.00 x 25 low-pressure tires improve traction. Power-proportioning differential applies up to 4 times more power to the wheel on firmest footing. Positive power steer shifts footing as needed for better pull. Powerful 4-wheel air brakes and Electrotarder provide ample braking action on steep grades. Front-wheel drive on prime mover lets the "C's" dump safely over the edge of fills because drive wheels are always on firm ground. Simple electric hoist raises body to vertical position . . . streamlined bowl clears even the wettest, stickiest loads in a few seconds.

Important savings for you

These same Tournarocker features, which are helping Leonard & Slate and E. C. Hall lick steep slopes and rough going, offer new low costs for your hauls, too. NEWEST C Tournarockers have increased capacity of 18 tons, 12½% greater than machines used here. Ask your LeTourneau Distributor about the 18-ton . . . also, 9, 35 and 50-ton Tournarockers. You get both job and profit insurance with all Tournarocker sizes, because you can use the 2-wheel prime mover to power other interchangeable units, including Carryall Scrapers, bottom-dump hoppers, flat-beds, haulers, and cranes. Call him, or write TODAY.

LETOURNEAU PEORIA, ILLINOIS **TOURNAROCKERS**

HIGH SPEED on RUBBER PLUS TRACTION ADVANTAGES of a CRAWLER

NOT in the *Contract*

One of the farmer's cows was missing and he set out to find it.

His little granddaughter from the city was helping look, but didn't seem to be worried.

"She can't go far, Grandpa," the child said. "I saw you draining her crankcase last night."

A man was discovered by his wife one night standing over his baby's crib. Silently she watched him. As he stood looking down at the sleeping infant, she saw in his face a mixture of emotions—rapture, doubt, admiration, despair, ecstasy, incredulity. Touched and wondering alike at this unusual parental attitude, the wife with eyes glistening arose and slipped her arms around him.

"A penny for your thoughts," she said, in a tremulous voice. He blurted them out:

"For the life of me, I can't see how anybody can make a crib like that for $3.49!"

A pink elephant, green rat and yellow snake walked into a cocktail bar.

"You're a little early boys," said the bartender. "He ain't here yet."

Boss: "Shame on you. Do you know what we do with office boys who tell lies?"

Boy: "Yes, sir, when they get old enough the firm sends them out as salesmen."

"How long did it take your wife to learn to drive?"

"It'll be ten years this fall."

Then there was the egotistical nurse who always deducted two degrees from her patients' temperature to allow for her personality.

The ship was sinking and the captain called all hands aft. "Who among you can pray?" he asked.

"I can," replied an ensign.

"Then pray, shipmate," ordered the captain. "The rest of you put on life jackets, we're one short!"

Papa bird said to mama bird: "Can you beat it? Just about the time we get a nest egg laid away, more bills accumulate!"

"How long did you say that new guy's been married?"

A good Scotchman named Sandy, naturally, went to see a doctor when he didn't feel so good. The doctor examined Sandy carefully and finally told him to return the next day and bring a sample of urinalysis.

Next day Sandy returned with a gallon jar, practically full.

The doctor was somewhat amazed at the quantity, but said nothing and the urinalysis was made.

"How was it, Doc?" Sandy asked.

"Nothing wrong there, Sandy," the doctor replied, and went on to tell Sandy that there really didn't seem to be anything much organically wrong with him. So Sandy left, with some advice and mild tonic.

"Well, how was it?" Sandy's wife asked as soon as he reached home.

"Everything is fine," Sandy told her. "I'm all right, you're all right, the boy's all right, the horse is all right, and the dog is all right."

Mom: "Get out of bed—I heard a mouse squeak."

Pop: "What do you want me to do —oil it?"

"We wouldn't be in this jam if we hadn't been in that bed together," said one strawberry to another.

"I think my wife is getting tired of me."

"What makes you think so?"

"Every day this week she's wrapped my lunch in a road map."

Phone Conversation—

"Is this the Salvation Army?"

"Yes."

"Do you save bad girls?"

"We do."

"Well, how about saving me a couple for Saturday night?"

Mother: "Now before you get serious with him, be sure he is always kind."

Daughter: "Oh, I'm sure he is; he told me he put his shirt on a horse that was scratched!"

"I shouldn't be offering you wine, should I?" the hostess said to a male guest. "You're head of the Temperance League, aren't you?"

"Oh, no, I'm head of the Anti-Vice League."

"Well, I knew there was something I shouldn't offer you."

1000 YARDS EVERY SHIFT

ON one of the northwest's toughest highway jobs—relocating 4.4 miles of U. S 2 along the steep sidewalls of rocky Pine Canyon, near Wenatchee, Washington—Goodfellow Brothers, Inc., assigned the most difficult hauling to 3 GM Diesel-powered 16-ton Tournarockers.

"They are working out *very* satisfactorily," said James B. Goodfellow. Powered by 186 H.P. 6-cylinder "71" engines, the rear-dump Tournarockers hauled 9 to 11 bank yards each trip. On one 2800-foot, one-way haul, job records show that the three GM Diesel-powered units easily handled shovel production of 1000 yds. every 8-hour shift—helping to keep the job on schedule despite steep grades, rough haul roads and confined hauling conditions at altitudes of 2000 feet.

Power at Every Downstroke

There are good reasons for this performance—rugged design and precision manufacture, two-cycle operation, a smooth flow of plenty of power, quick acceleration and the always-ready-to-go qualities of General Motors Diesels.

These engines are offered as standard or optional equipment in over 500 kinds of power machinery by 120 different manufacturers. They are backed by the experience gained in building more than 315,000 Series 71 units totaling over 48,000,000 horsepower.

For any equipment you buy or re-power, it will pay to specify GM Diesel power.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up to 800 H.P.

GENERAL MOTORS

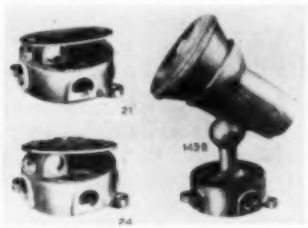
GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

New Equipment

Continued from page 41

cast aluminum includes a variety of covers and fittings for universal use on almost any outdoor wiring or lighting job. The box itself has four hubs tapped ½-inch IPS, is provided with or without mounting lugs, has a flat



aluminum cover plate sealed with a heavy cork gasket and a separate cast aluminum cover tapped ½-inch IPS to take standard lamp holders for the 150, 200 and 300-watt outdoor weatherproof reflector bulbs now available as standard stock from all major lamp bulb manufacturers.

Used with lamp holders, and mounted on walls where buildings form boundary lines, the unit is effective for property-line lighting and for floodlighting of work areas.

Diesel Pile Hammer

Manufacturer: Syntron Co., Homer, Pa.

Claims: An entirely self-contained unit, operating on diesel oil from a fuel tank mounted on the hammer, it requires no auxiliary power supply equipment such as a steam boiler or air compressor with their necessary pipe, throttle valve, lubricator and hose connections. Permits the owners of gasoline or diesel engine driven cranes to turn them into pile driving outfits.

Fits in standard 20½-in. leads and requires one line for lifting the hammer and another for both lifting the pile and for starting the hammer, by lifting its piston. Uses approximately two gallons of fuel per hour, and very little lubricating oil.

The force of each blow is remote controlled by the operator on the ground by a hydraulic fuel pump control system that operates similar to automotive hydraulic brakes. It is easy to vary from zero to full power per blow, and will idle without impact and without stalling.

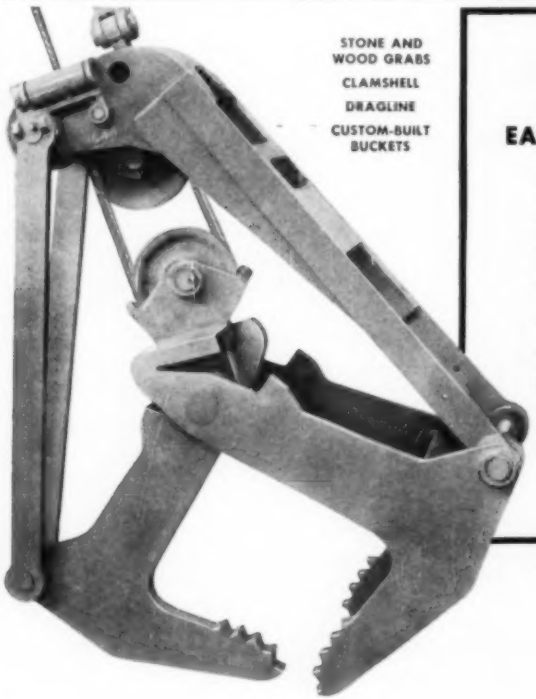
The ram or striking piston weighs 5,400 pounds and has a 48-in. stroke that develops up to a maximum 16,000 foot pounds per blow at the rate of 84 blows per minute. Fitted with a standard head for driving wood piles, and can be supplied with adapters to drive other types of piles.

Welding Electrode

Manufacturer: Harnischfeger Corp., Milwaukee 14, Wis.

Claims: Features of this heavily coated electrode are time-saving penetration and solid fusion. In making a weld, it leaves a negligible deposit of the weld metal so that the fusion consists mainly of the parent metal. This gives the weld a stronger, more uniform character.

Some of the applications of this ac and dc electrode are: quick, inexpensive welding of heavy sections, fast easy making of horizontal fillet welds, getting best results on a vertical down



STONE AND WOOD GRABS
CLAMSHELL
DRAGLINE
CUSTOM-BUILT BUCKETS

WELLMAN

EASY HANDLING OF LARGE STONES

• Those big stones won't slip from the Wellman Stone Grab. Four-part closing cable reeving develops tremendous closing force on stones. Model shown has 5-ton capacity, 4½ foot jaw spread. Other capacities available.

Want Facts? Send for free descriptive bulletins.

THE WELLMAN ENGINEERING COMPANY
7000 Central Avenue
Cleveland 4, Ohio

weld, gouging removal of cracked and faulty welds, safe cutting of stainless steel, mild steel, manganese, bronze, aluminum and cast iron. This electrode is produced in three sizes, 1/8 inch for use at 300 amps, 5/32 inch for use at 400 amps, and 3/16 inch for use at 450 to 500 amps.

Gooseneck Trench Hoe

Manufacturer: Harnischfeger Corp., Milwaukee 14, Wis.

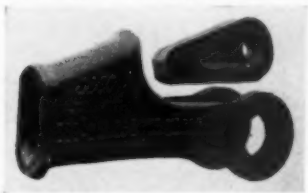
Claims: Model 150, ½-yd. trench hoe is now equipped with the new gooseneck boom. The new boom follows the design which was introduced recently on the model 255-A.

The design of the new boom makes possible higher speeds, greater digging depths, maximum ruggedness and better over-all performance. In addition, this machine is highly adaptable for use as shovel, dragline, clamshell or crane.

Fifty per cent greater speed is obtained by this trench hoe through the use of a 2-part hoist line. Its greater digging reach and depth and greater dumping height mean fewer moves and more yardage.

A greater amount of power is made available for the toughest digging by a low gear transmission. This trench hoe can start a trench with a vertical cut and is able to trim vertical walls. A special hoe stick linkage provides a chopping action.

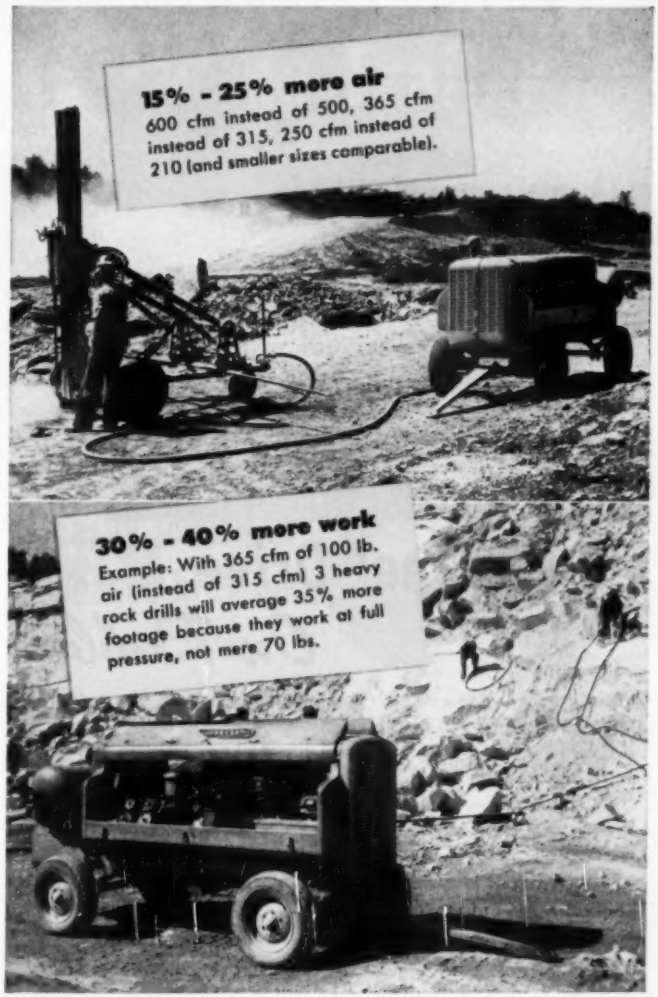
Long-Bowl Rope Socket



Manufacturer: Electric Steel Foundry Co., Portland 10, Ore.

Claims: Socket has wedge and socket grooves corresponding to the correct rope diameter, thereby preventing distortion and crushing of the rope. Crushing and distortion are further guarded against by the combination of the longer bowl and increased wedge angle. This combination increases rope

"new standard" Jaeger Compressors


15% - 25% more air
600 cfm instead of 500, 365 cfm instead of 315, 250 cfm instead of 210 (and smaller sizes comparable).
30% - 40% more work
Example: With 365 cfm of 100 lb. air (instead of 315 cfm) 3 heavy rock drills will average 35% more footage because they work at full pressure, not mere 70 lbs.

Why starve your modern air tools with "old standard" compressors that have not increased their air output in 19 years? Jaeger Air-Plus standards provide the increased air you need to power today's tools at their full efficiency—*at the lowest cost per foot of air of any compressors on the market.*

See your Jaeger distributor or send for complete Catalog

THE JAEGER MACHINE COMPANY

553 Dublin Ave., Columbus 16, Ohio

PUMPS • MIXERS • HOISTS • TRUCK MIXERS • PAVING MACHINERY

Walks readily through loose backfill sand above newly-laid sewer.

There's plenty of traction and flotation to wade through mud too.

Four-Wheel Drive PAYLOADER

On Rubber Tires

This big 1½ yd. Model HM PAYLOADER with its combination of large pneumatic tires and 4-wheel drive gives you fast-action traction on all kinds of footing — on sand, stone, snow, clay or mud. It gives you crawler-like traction at far less maintenance expense . . . speed when you want it . . . the ability to work on pavements. It travels over streets and highways without using a trailer.

This special tractor-shovel also provides easy operation and maneuvering speed through its power-boosted steering and full-reversing transmission. There are four speeds in reverse as well as forward. Double-acting hydraulic rams raise and lower the booms . . . dump and close the bucket . . . exert tons of down-pressure for tough digging conditions.

See a Model HM in action and you'll know why hundreds of contractors and road and street departments are enthusiastic owners and boosters. The Frank G. Hough Co., 708 Sunnyside Avenue, Libertyville, Illinois.

Literature on the big 1½ yd. Model HM and six smaller PAYLOADER sizes, down to 12 cu. ft. bucket capacity, is your's for the writing.

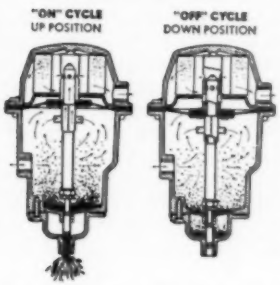
PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

life because the wedge grips a length equal to six times the diameter of the rope. Ample clearance between the wedge and socket bowl assures a firm pressure on the rope.

Sockets in sizes up to and including 1⅛ inch accommodate two rope sizes using the same wedge. Sizes 1¼ inch to 2⅝ inches use wedges individually varied in eighths of an inch to accommodate each specific rope size. A size 1 inch to 1⅛ inch open socket weighs only 23 pounds without the wedge.

Air Line Cleaners



Manufacturer: Wilkerson Corp., Denver, Colo.

Claims: Valves automatically remove contaminants and precipitates from compressed air lines, after-coolers, sumps, tanks and air brake systems. Equipment eliminates manual attention or adjustment as well as saving in man-hours, maintenance materials, air tools repair parts and pneumatic machine replacements. The line includes automatic separators and drains and has been field tested in industrial installations as well as on truck, bus and railroad locomotive equipment.

When air line is not in use the diaphragm is forced down by back pressure with the O-ring sealing the sump bottom. As air is used the pressure differential raises diaphragm and shaft, seals bottom of middle chamber, opens bottom of sump and blasts out contamination.

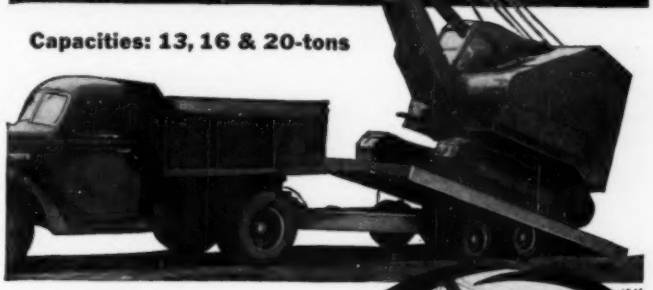
Welding Cover Plate

Manufacturer: General Scientific Equipment Co., Philadelphia 32, Pa.

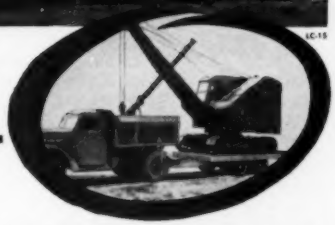
Claims: Plastic welding shield will last 1,000 hours, won't warp or crack, non-pitting, offers crystal clear visibility. The plastic used in these cover plates is noted for its fine optical qualities. It resists pitting from weld spatter and gives added impact protection to costly welding filter plates. Plate is good for many months of reliable service, saves valuable production time; spatter proof, won't discolor, made of solid plastic.

New HEAVY-DUTY Tilting Trailer cuts hauling costs!

Capacities: 13, 16 & 20-tons



Easily loaded or unloaded in 5 min. by 1 man



NOW, with this new La Crosse tandem axle tilting trailer, you can use YOUR OWN DUMP-TRUCK to speed job-to-job moves of ¾-yd. shovels and other powered equipment. It's quick, easy, economical! No skids or blocking required . . . no expensive one-purpose trucks! One man simply hooks trailer to dump truck . . . unlocks safety catch to tilt trailer platform . . . drives equipment onto deck . . . and he's ready to go. Double-acting hydraulic cylinders level platform for traveling. Special La Crosse tandem axles assure smooth riding over any road, while husky constant rise S cam brakes give you quick, safe stops with minimum wear on linings. Write for complete details on this new money-saving trailer.

Check Today!

LA CROSSE TRAILER CORPORATION, La Crosse, Wis.

Send full details on La Crosse ☐ Tilt Trailers ☐ Standard Low Beds

We may be interested in a.....ton trailer about.....
for hauling.....
(Type of load)

Name.....
Occupation or business.....
Address.....
City.....State.....

LaCROSSE
America's Favorite LOW BED TRAILER

Pine Flat Dam

Continued from page 19

came out as fast as it could come. The rising water covered its tracks as they crawled up out of the hole. At 3:40 an estimated 20,000 second-feet was roaring down the river. Less than 50 minutes later that was doubled, and the timber wall gave at one point. The stream started pouring through, but even so, it still rose. The upstream earth and rock cofferdam was soon topped, and at 4:30 the entire working area lay submerged under a muddy pool.

Darkness came on and people below the dam were marooned on an island that was practically awash. A California Highway Patrol sergeant evacuated the people with an outboard motorboat. The rain continued and by midnight the Kings River had peaked at 100,900 cubic feet per second; an all-time record. It was 82,900 second-feet more than any previous November flow.

When the water went down, the entire construction area lay under sand and silt, from 7 to 10 feet thick. Utilities lines were ruined, and the small equipment that had remained in the hole was lost. Government engineers estimated that it might be months before work could be resumed, but the contractors got busy.

Second Flood Strikes

The Bucyrus-Erie 54-B moved back in for a time; so did a Northwest 80-D dragline. Two Caterpillar D8 dozers began scooping debris from the tops of the higher concrete monoliths. The 80-D dragline loaded the material to 20-yd. Western end-dump trucks. Soon three Euclid trucks also came in. A D8 with a Caterpillar model 80 scraper helped out. Working day and night, the equipment had made a sizable showing when on December 3 another flood of 38,000 second-feet came roaring down. It, too, overtopped the cofferdam. Three weeks later, the equipment had the hole cleaned up again.

Major damage also happened at the aggregate production site. Practically all railroad tracks were ruined and had to be re-laid. All haul roads had to be re-established. The government also lost a new $200,000 bridge it had built by contract to provide the contractors an accessway to the dam. A change order was issued so Pine Flat Contractors could go ahead with a heavy-duty timber and pile bridge to replace the one that had washed away.

E. H. Gruenwald, resident engineer for the Corps of Engineers, praised the speed of the men who dug out the damage. "They were ready to go again weeks before the most optimistic of us thought they could," he said.

Aggregate Production Resumes

When the flood damage was repaired, one of the most vital phases of the construction operation was resumed: the production of raw aggregate seven miles downstream from the dam.

The river at that point has a much wider floor than at the damsite, and through the centuries, a deep, well-graded pocket of natural rounded aggregate has been deposited. Aggregate recovery occupies a 215-acre plot of this river valley, covering a rectangular area 6,800 feet long by 1,500 feet wide.

The deposit is being removed beginning with the north side, in regular strips about 60 feet wide by 18 feet deep. A Caterpillar D8 tractor and

They're SAFE . . RUGGED . . and ready to ROLL!

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THERE'S A JAHN TRAILER FOR EVERY HAULING NEED

Tandem Axle Trailers

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Single Axle Trailers

a 12-yd. LeTourneau scraper first rough-grade a site for a standard-gauge railroad track, which hooks on to the first processing plant through switches and a more or less permanent track line. The railroad track is then established paralleling the length of of the aggregate deposit, leaving room enough inside the track area and the pit for a loading dragline to work.

High Aggregate Production

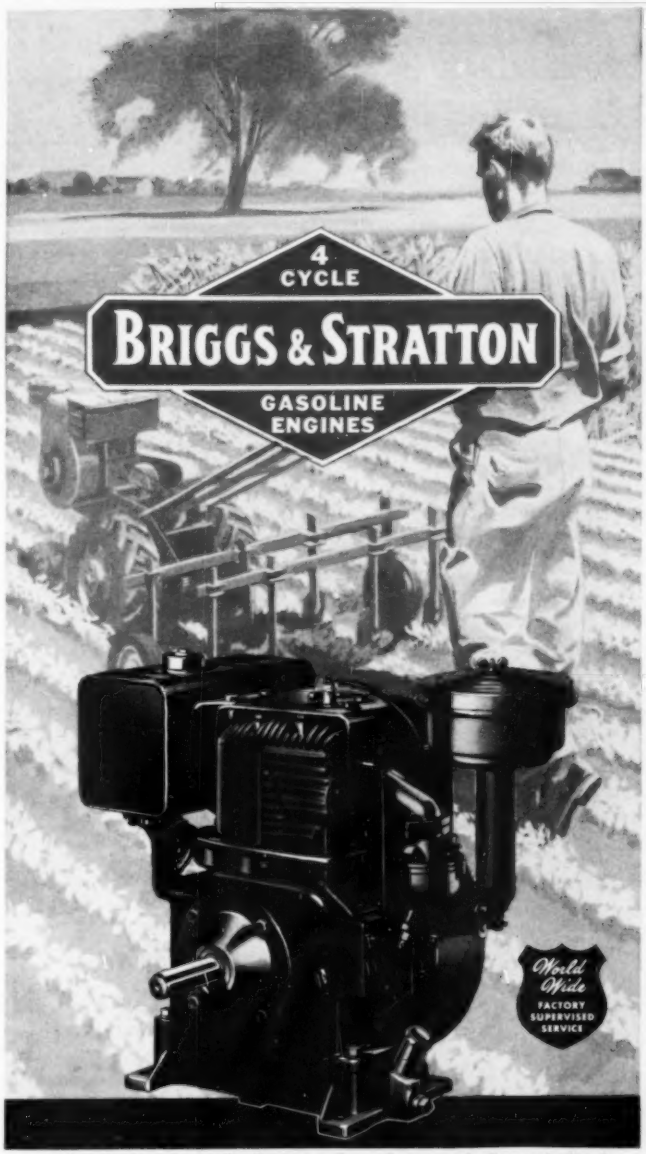
Excavation of raw aggregate is a man-sized job, because a machine capable of digging approximately 3,000 cubic yards per 8-hour shift is required. Pine Flat Contractors selected an electrically-powered 120-B Bucyrus-Erie dragline, with a 70-ft. boom and equipped it with a special oversize 6-yd. Esco bucket. Using electricity from a nearby PG&E substation, the dragline converts the 2,300-volt current into mechanized energy and aggregate production.

Hauling equipment between the dragline and the plant includes two General Electric 44-ton locomotives, each pulling three 30-yd. Koppel or Western side-dump railroad cars. Good coordination between each locomotive engineer and the dragline operator makes dragline work a fast, constant performance. As the dragline operator begins to load the train from the end farthest from the locomotive, the engineer keeps moving the train forward between dragline swings. It takes five digging cycles to fill one of the 30-yd. cars. The last bucket is dumped in the end of the car nearest to the locomotive, and the train is on its way to the plant. The second train, now empty, comes quickly to position.

It requires many shifts to remove a 60-ft swath 18 feet deep, but when a strip is draglined out, the new tracks are ready for the next one. The 120-B is able to work most of the time at optimum capacity, because track grading always takes care at the same time of a good level spot for the big dragline to work. The pit contains an average of 25% boulders that are too big for concrete aggregates, but that does not relieve the dragline from excavating them. It takes a strip clean through, and any separation of aggregates is a later function.

Material Graded and Cooled

Corps of Engineers specifications call for a maximum concrete temperature of 50° F. at the time of placement, and for near-constant fineness modulus



Preferred power for garden tractors and a wide range of other agricultural equipment — the world's most widely used single-cylinder gasoline engines on machines and tools for industry, construction, railroads, oil fields, etc., and on appliances and equipment for farm and home.

"PREFERRED POWER" for home, farm, and industrial equipment — powered by gasoline engines. Briggs & Stratton Corporation, Milwaukee 1, U.S.A.

In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.

as to size. The disposal of material from the 120-B is therefore a complex, precise operation.

At the raw aggregate pit, the Western and Koppel cars dump the material to a 120-yd. hopper, where feeders and a belt conveyor carry it up to the top of the primary separation plant. The function of this plant is to kick out the oversize rocks, and separate the entire amount of usable aggregate in two piles. Everything from six inches down to one-quarter inch goes to one storage pile; sand smaller than one-quarter inch goes to the other. Oversize rock and debris larger than 18 inches is kicked off by grizzly bars at the dump hopper. Oversize from 6 to 18 inches is scalped off by the first screen of the plant, a Ty-Rock vibrating screen covered with 7-in. mesh. This oversize then drops down direct to four Western 20-yd. dump trucks, which haul it away to a waste area.

An American and a Baldwin 100-ton locomotive, drawing 8-car trains of 30-yd. Magor side dump cars, then haul the material up the 5½-mile railroad to the dam. A subcontract to Sharp & Fellows of Los Angeles was let to construct a railroad from the Avocado aggregate area to the dam.

At the end of the railroad line, the material passes through a large washing and screening plant. The sand is separated into several piles. One mound is a drainage pile, where the excess moisture can drain for 72 hours. There are four blending piles, plus a main storage pile. The rock is graded into four sizes: 6 to 3 in.; 3 to 1½-in.; 1½ to ¾-in.; and ¾ to ¼-in.

A 3,600-ft. belt conveyor 36 inches wide carries the various materials up to a re-screening tower, which reclassifies the rock and removes small particles caused by breakage at the transfer points in the line. The aggregates are then cooled by a blast of 35° cold air, as they lie in the batching bins. Tube ice from three ice machines also helps to cool the concrete, and it is used as a part of the water.

Four 4-yd. Smith mixers mix the batches, dump them to a surge hopper, and an electrically driven transfer car carries the material to an 8-yd. Gar-Bro concrete bucket handled by the cableway which delivers it to the dam.

Believing strongly in the maintenance and upkeep of all equipment, Pine Flat Contractors has established a well-organized shop near the office.

Standard maintenance on the stock equipment like Bucyrus-Erie machines, Ingersoll-Rand compressors and so on, consists largely of the replacement of factory parts and routine fuel and lubrication service. There are telephones at every major stopping point in the project, with dial systems permitting rapid calls. The locomotives on the aggregate haul also have radio equipment, so communication is fast when a piece of equipment breaks down.

Some of the concrete equipment, however—particularly on the high-speed cableway which can travel and hoist at the same time—is custom made, and the replacement of parts is a manufacturing job. The equipment shop has lathe and other power equipment to perform this work. Besides the 18-in. lathe, major equipment includes a Wells 8M metal band saw, a Hamilton drill press, a Hendley 24-in. crank shaper, an Oster deluxe threading machine, a 5-ton Yale hoist, a 1-ton Budgit hoist, oxy-acetylene equipment, electric welding machines, and many small tools. The main shop is a Butler 40 x 100 galvanized sheet building with a structural steel frame.

Real Safety Program

At least once a month, officials and all department heads meet for a safety parley and a general get-together. There is an ambulance and a first-aid hospital on the project. At Pine Flat Dam everybody wears a hard hat, and there are no exceptions. Good walkways, sound ladders to the concrete pours, machinery guards and the sound interchance of common-sense safety ideas are the rule.

Earl Jannett, project manager, has general field supervision for Pine Flat Contractors. Guy Heimsoth is assistant project manager, George Archibald is general superintendent, and Richard G. Rofelty is the project engineer. Jim Brown is plant superintendent, Everett Govan is electric superintendent, Glen Roper supervises rigging, Frank Ryan is master mechanic, Joe Lawrence is carpenter superintendent and Ed Swanson is concrete superintendent.

E. H. Gruenwald, resident engineer, heads up the field force for the Sacramento District of the Corps of Engineers. Charlie Beatie is assistant project engineer and Al Cervi is office engineer. J. R. Morton is chief of operations and Lt. Col. C. C. Haug is district engineer.

EASY TO ASSEMBLE

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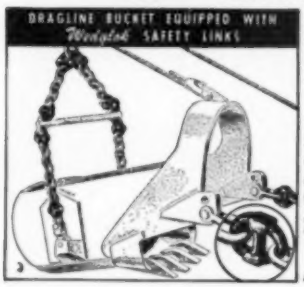

An improved connecting link that combines safety and simplicity. Its strength exceeds the published strength of comparable alloy chain.

WEDGLOK links can be assembled rapidly on the job—no special equipment required; particularly useful for dragline buckets, slings and other equipment with chain or wire rope attached.

Regular and pear shape. Sizes ⅜" to 3"

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What's behind the Euclid name?

Building a road in the mountains of Colorado—this Euclid is dumping 15 tons of fill material.

Working on a levee in Arkansas—Bottom-Dump Euclids are the outstanding choice of levee contractors.

Getting a 22-ton load of rock at Downsville Dam in New York—"Eucs" are built for heavy off-the-highway work.

* PARTS AND SERVICE FACILITIES

The Euclid reputation for long, dependable service life and efficient performance is backed by strategically located distributors and factory branches. Adequate stocks of genuine Euclid parts and the facilities of this world-wide organization assure prompt service to Euclid owners everywhere.

The fact that 80 per cent of all Euclids built are still in use today is proof of their rugged construction and staying power on the toughest jobs. Readily available parts and service result in less down time and customer satisfaction.

Have your Euclid Distributor show you how "Eucs" can lower your off-the-highway hauling costs. Ask about the models best suited for your own job requirements.

The EUCLID ROAD MACHINERY CO.,
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MORE LOADS PER HOUR—
MORE PROFIT PER LOAD

EUCLIDS *Move the Earth*

4 Bantams® speed widening of Maine highway

To speed widening and rebuilding of Highway No. 100 north of Augusta, Me., Herbert Sargent, Inc., of Stillwater, drove in 4 low-cost Bantam excavators on rubber tires. Versatile 35 m.p.h. Bantams quickly paid off by making money on dozens of *"work-and-run"* jobs, where it formerly cost more to move big equipment in and out than it did to do the work. Bantams saved time handling blasting mats (as illustrated) . . . cut cost of loading fill, aggregate and blasted rock . . . made fast changes from ⅜-yd. shovels to trench hoes for digging drainage ditches and water lines. You, too, can save time and money with Bantams . . . ask for demonstration!

Clip... Mail today!

SCHIELD BANTAM CO., 202 Park St., Waverly, Iowa SB-C-11

Send details on truck-mounted Bantam { ☐ Shovel ($6195)* ☐ Hoe ($6040)* ☐ Pile Driver ($6110)* ☐ Crane ($5520)* ☐ Dragline ($5940)* ☐ Clamshell ($6080)* }

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*Less truck. F.O.B. Waverly, Iowa. Prices subject to change without notice.

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Costs less... goes anywhere fast

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Notes from the manufacturers

Lima-Hamilton Division of Baldwin-Lima-Hamilton Corp. announces the appointment of Henry Barnhart as general manager of the Lima Ohio Plant and J. F. Connaughton as assistant general manager. Mr. Barnhart, also a vice-president of the corporation, has been connected with the corporation and predecessor companies since 1928, becoming general sales manager in 1936 and vice-president in 1944. Mr. Connaughton has been with the corporation since 1928. Recently, the assets and business of Austin-Western Co., Aurora, Ill., became a part of the Baidwin-Lima-Hamilton Corp.

American Tractor Corp., Churubusco, Ind., has begun construction which will triple production facilities. Construction is scheduled for completion about May 1. The new buildings will be completely fireproof, with masonry walls and solid concrete roofs. Each will provide an additional 15,000 square feet of space.

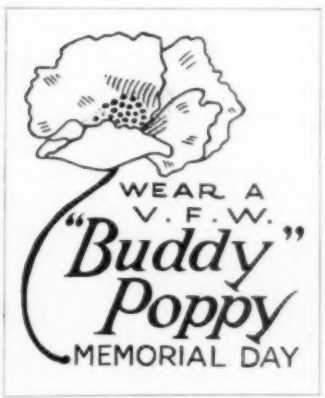
Reed Roller Bit Co., Houston, Texas, has announced the appointment of Equipment Sales Co., Phoenix, Ariz., as distributors of Cleco products in that area. In addition to handling the full line of Cleco pneumatic tools, Equipment Sales Co. will maintain complete stocks of Cleco-parts and accessories for the convenience of customers in their territory.

General Electric Co., Schenectady, N. Y., announces a new educational program designed to aid in the rapid training of industrial personnel in the selection and application of modern electric motor drives. The motor program is devoted to the task of quickly indoctrinating qualified personnel in the nation's factories as an aid to mobilization. The industrial motor program consists of a motor selection and application course made up of nine 35-mm black-and-white slidefilms, student review booklets on each lesson, and an instructor's manual. Each film has a running time from 15 to 30 minutes and is accompanied by a 16-in. sound recording of the script. The student booklets are intended to be passed out for home review

to those taking the course. They contain reprints of slidefilm scripts with key pictures, quick-review outlines, and sets of test questions. The program will be distributed in April to G-E district offices throughout the country for showings to interested groups. These will include users and potential users of electric motors, application engineers, power sales engineers, machinery manufacturers, designers, contractors, consulting engineers, and students.

Euclid Road Machinery Co., Cleveland, Ohio, has appointed N. A. Burkitt, Inc. as distributor of Euclid off-the-highway hauling equipment, loaders and scrapers for the State of Maine. Located in Scarboro, Maine, a suburb of Portland, the company is headed by N. A. Burkitt, President. Otis Graham and Ralph Stevens complete the field sales staff. Also announced is the appointment of Dietrich-Collins Equipment Ltd. of Vancouver as exclusive distributor for the Canadian Provinces of British Columbia and Yukon. This new distributor for Euclid will sell and service the complete line of equipment consisting of off-the-highway hauling units, self-powered scrapers and the Euclid Loader. In addition to carrying parts stocks for all equipment lines sold by the company, extensive shop facilities for overhaul and repair are maintained.

Detroit Diesel Engine Div., GMC, announces an increase in the sales and service facilities of West Coast Engine and Equipment Co., distributors in northern California. They will move into a new building located on Eastshore Highway in Albany approximately one mile from the company's former headquarters in Berkeley. Floor space will be increased to over 15,000 sq. ft. and their new facilities will include



The MAJORITY of Your
Heavy Hauling Jobs
can be handled
PROFITABLY with...
the POPULAR

ROGERS Type "T"

LARGE CAPACITY IN AN 8 FT. DECK WIDTH—LEGAL IN ALL STATES. 8 TIRES ON 2 ROCKING STUB AXLES WITH LEVEL OR DROP DECK IN 15, 20, 25, 30 and 35 TON CAPACITIES

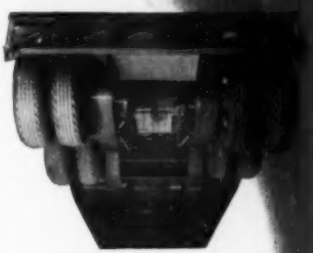
By reason of its versatile adaptability to all kinds of heavy hauling jobs, the Rogers Type "T" has steadily increased in popularity.

It's a "natural" for small and large contractors and haulers.

If you are considering the purchase of one or more trailers, by all means investigate the Type "T".

It packs powerful advantages in a multi-purpose single unit.

Write for full details and catalog.



A worms-eye view of the sturdy rear end and frame construction of the famous "T".

The rear end design of the Type "T" has proved so efficient it has been adopted as standard construction in Rogers Power-Lift Detachable Gooseneck Trailers.

EXPERIENCE builds 'em — ROGERS — PERFORMANCE sells 'em

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"RODGERS I BEAM OR GIRDER TRAILER"

EQUIP NOW
EASIER-FASTER
BLAST HOLE
Drilling

McCARTHY
MOBILE-MOUNT
VERTICAL
DRILLS

● You're set to drill all ordinary rock formations when you're equipped with mobile-mounted McCarthy Vertical Drills. These heavy, rugged McCarthy units are compactly designed for truck, half-track, cat or "Jumbo" mountings. They're easy to move about, easy to set up. They're equipped with finger-tip hydraulic controls; your choice of electric, diesel or gasoline power units.

Recently, on one difficult job, workers using McCarthy equipment drilled an 8-inch hole 100 feet deep in only 40 minutes!

Write today for full facts about McCarthy Drills. See for yourself how you save valuable time on the job by using a McCarthy — **the toughest, fastest, most efficient unit ever made.**

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THE SALEM-TOOL CO.
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SALEM, OHIO, U. S. A.

glassed in display room, enlarged parts department and assembly areas, overhaul bays, injector room and ample heavy equipment cleaning areas.

Huber Manufacturing Co., Marion, Ohio, has named E. W. Systrom Co., Watertown, Mass., distributor for the Massachusetts-Rhode-Island area. Offices and warehouse are located at 15 North Beacon St. in Watertown. A complete parts stock is maintained. Systrom personnel include: John McGlew, sales manager; William Earle, Ralph Sanesi, and Frank McManus—district sales managers; Larry Martin, parts and service manager, and two service men.

Straub Manufacturing Co., Inc., Oakland, Calif., has obtained a license arrangement with W. G. Armstrong Whitworth & Co. Ltd., Gateshead-Upon-Tyne, England, who are now proceeding with the manufacture and distribution of the complete line of Straub machinery. Their iron and steel foundry facilities, machine shops and engineering staff will service Great Britain, Eire, Europe, South Africa, India, Pakistan, Australia and New Zealand.

Reed Roller Bit Co., Houston, Texas, has announced the appointment of Olson Equipment Co., Minneapolis, Minn., as distributor of Cleco products in that area. In addition to handling the full line of Cleco Pneumatic Tools, Olson Equipment Co. will maintain complete stocks of Cleco parts and accessories for the convenience of customers in their territory.

Timken Roller Bearing Co., Canton, Ohio, announces the appointment of Paul Reeves as director of sales. Mr. Reeves came to Timken in 1929 and after completing the engineering training course served as sales engineer in the company's Chicago office. He was subsequently transferred to the San Francisco branch office where he was made industrial district manager. He was appointed advertising manager in 1943.

Double Seal Ring Co., Fort Worth, Texas, announces the promotion of M. A. Moore, who was formerly sales and service representative in Maine, Vermont and New Hampshire, to sales manager in the company's Eastern division factory at New Rochelle, N. Y.

Modified Ditcher

Continued from page 27

ern end of San Francisco Bay, then proceed in a northwesterly direction to the Pulgas Tunnel, again joining existing lines leading to the San Francisco Water Department's Crystal Springs Reservoir.

Involves Three Contracts

Construction of the 34-plus miles of pipeline involves three contracts; 8½ miles at both the Irvington Portal and Pulgas Tunnel ends being handled by United Concrete Pipe Corp., on $2,147,582.50 and $2,098,888 contracts, respectively; and the 17-plus miles of center link being laid by Los Angeles contractors Artukovich Bros. and Steve Rados, joint venturers with a $4,097,546 contract.

The eastern end of the project involves the 78-in. steel-reinforced concrete pipe. The 17-plus mile center section consists of 72-in. lined and coated steel pipe, while the Western end makes use of 72-in. steel-reinforced concrete pipe.

Replace Submarine Line

Existing San Francisco Water Department lines between Irvington Portal and the Crystal Springs storage go directly across San Francisco Bay, crossing marshland on trestles and resting on submarine trestles at the bottom of the bay. In the event of earthquake or other damage, considerable underwater repair would be necessary to these lines. In bringing the auxiliary pipeline around the tip of the bay, some extra mileage is involved, but the expensive problem and time element of underwater repair will be eliminated.

"Oh dear, I must have sat down too fast I heard my girdle give out."

New trade literature

Title: **Soil Testing**

Subject: Catalog covers new products in the soil testing apparatus line. New Soiltest models of triaxial and consolidation apparatus and accessories, paraffin warmers, dispersion mixers, direct shear apparatus, laboratory and field California Bearing Ratio apparatus, humidifiers, humid boxes, the Terzaghi water level for differential settlement observations, classification sets, a portable indicating pyrometric controller, the Harvard miniature compaction apparatus and laboratory timers are all discussed.

Where to Get: Soil Testing Services, Inc., Chicago 39, Ill. (Free)

Title: **Surface Drainage**

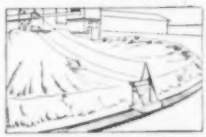
Subject: Three research papers and a report on surface drainage. The report is principally a progress report which summarizes the latest developments and gives the status of work on certain hydraulic and hydrologic research, within the United States. Research report on flood frequency by Tate Dalrymple, U. S. Geologic Survey, describes modern techniques and practices in making flood frequency analyses using stream discharge records that are now being accumulated through a nationwide stream-gauging program. The paper shows how gauging station records for a large region may be applied for estimating flood frequencies on local ungauged streams. The case of a study in the Maumee River Basin in Ohio, Indiana and Michigan is given as an example of how the principle and the methods described may be applied. Research reports on surface runoff from agriculture watersheds by W. H. Potter, U. S. Department of Agriculture, describes characteristic differences in the hydrologic behavior of small and large watersheds. It is pointed out that more nearly correct sizes and economical uses of small drainage structures are made possible through improved methods of estimating the frequency and magnitude of peak runoff. To this end the author compares different analytical procedures and presents examples of the successful application of probability studies for integrating the effects of many factors which influence surface runoff. Tentative results on capacity of curb opening inlets, a report by Carl F. Izzard, discusses preliminary findings from a cooperative investigation

Whether it's digging, dredging, storing or reclaiming

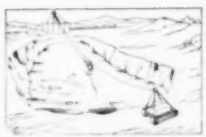
a SAUERMAN MACHINE CUTS COSTS TO ROCK BOTTOM

Picture shows a Sauerman drag scraper digging into a ridge of volcanic ash 250 ft. high and loading the ash into cars.

Sauerman Scraper Excavator



Sauerman Scraper Stockpiler



Sauerman Slackline Cableway

Sauerman Tower Excavator

Engineers and managers in construction, mining, processing, and other industries find that many problems of handling materials can be simplified by using one or the other of the various types of Sauerman Cableways and Power Drag Scrapers. These machines offer the particular advantage of being able to span a large area and move material at a rapid rate from point to point anywhere within that area.

The economic advantages of Sauerman Scraper and Cableway machines are as great as their operational advantages. The first cost of a Sauerman installation is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator. Moreover, the equipment is very flexible; can be extended readily and otherwise adapted to changing conditions.

The different Sauerman machines are described in detail in a series of catalogs, liberally illustrated with drawings and photographs. Tell us about your material handling problems and we will send you the catalogs that will be of most interest to you. Or use the coupon below.

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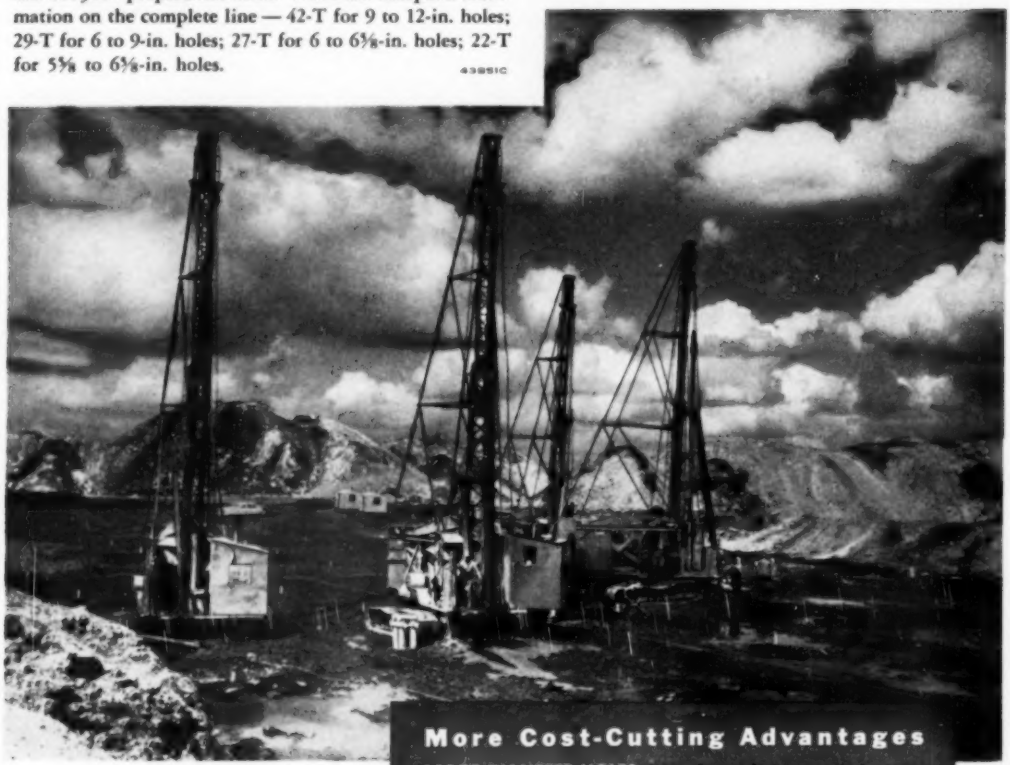
FAST DRILLING ACTION WITH SHATTERING IMPACT

PICTURE 50 to 60 stroke-per-minute action with blows that hit with a shattering snap and you will see why Bucyrus-Erie blast hole drills give you extra hole footage at lowest possible cost.

That's why strip mine operators everywhere are proving to themselves just how much time can be saved in preparing overburden for removal — why more strip mine operators buy Bucyrus-Erie blast hole drills than any other make.

Find out how these fast-working, shatter-action drills can cut *your* preparation costs. Write for complete information on the complete line — 42-T for 9 to 12-in. holes; 29-T for 6 to 9-in. holes; 27-T for 6 to 6⅞-in. holes; 22-T for 5⅜ to 6⅛-in. holes.

439SIC



More Cost-Cutting Advantages

LARGE DIAMETER HOLES mean fewer holes needed.

TRACK-MOUNTED for easy moves to location.

RUGGED, SHOCK-FREE CONSTRUCTION reduces maintenance costs.

CONVENIENT CONTROLS for greater operator comfort and safety.

SMOOTH, AMPLE POWER, either diesel or electric, to fit your needs.

TELESCOPIC DERRICK (42-T and 27-T) lets you move with mast up and bits suspended.

HYDRAULIC JACKS (42-T) provide fast, simple leveling.

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

on hydraulics of storm drains for express highways at the University of Illinois. The results from the Illinois experiments and some data taken from earlier researches in North Carolina, Minnesota and Iowa are used in the derivation of formulas, and in verifying conclusions as to certain recommended features of designs for curb openings and grating inlets.

Where to Get: Highway Research Board, Washington 25, D. C. (90c)

Title: **Clamshell Buckets**

Subject: Catalog describes all-welded clamshell buckets in sizes ⅜ to 2½ yards. A complete table of condensed specifications, listing the details of capacity, weight, dimensions, sheave and cable data for each size and type of clamshell is given. Photographs of clamshell buckets are included along with a summary of the manufacturer's complete line of concrete batching and cement handling equipment.

Where to get: C. S. Johnson Co., Champaign, Ill., or any Johnson distributor. (Free)

Title: **Stress Distribution in Soil**

Subject: The tests described in this report were made on a homogeneous clayey-silt section containing 37 earth pressure cells and five deflection gauges. The program of tests included measurements of stresses in the vertical, two horizontal, and two diagonal directions and measurements of deflections in the vertical direction. The test results are discussed and comparisons are made showing the similarity of the distribution pattern of the measured stresses with values computed from the theory of elasticity. Data are also presented showing the similarity between the field stress-strain relation obtained in the test section with those obtained in the laboratory by triaxial tests.

Where to Get: Highway Research Board, Washington 25, D. C.

Title: **Tractor Catalog**

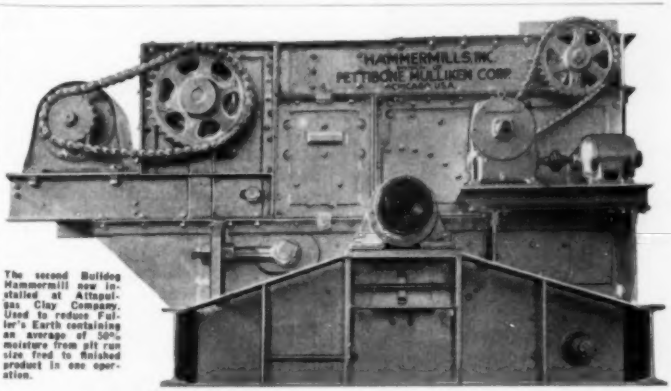
Subject: Booklet, published annually, contains a complete listing with pictures and brief specifications of all but two of the current line of Caterpillar products, 81 in all. Eleven new models were announced during the past year, nine of which are included in this issue. The list of additions ranges from tractors to tool bars.

Where to Get: Caterpillar Tractor Co., Peoria 8, Ill. (Free)

Title: **Tractors and Equipment**

Subject: Two illustrated booklets discuss Caterpillar tractors and bulldozers. The first tells the story of tractors, their origin, construction and performance, the dealer organization and the results of all these features. The second booklet concerns bulldozers and explains how

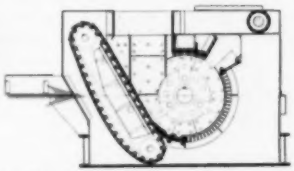
"Oh! Oh! The wife's slipped me the baby to take care of again today."



The second Bulldog Hammermill now installed at Attapulgus Clay Company. Used to reduce Fuller's Earth containing an average of 50% moisture from pit run size feed to finished product in one operation.

Bulldog Hammermill

with Moving Breaker Plate



For wet, sticky material reduction . . . for those tough, heavy-duty crushing jobs.

Illustrated above is the last word in Moving Breaker Plate Hammermill design. It is built by an engineering organization whose experience far surpasses any organization that might furnish Moving Breaker Plate crushing equipment.

Design Improvements have increased reduction efficiencies and lowered H.P. requirements. You can see this equipment in operation at any time. Also Hammermills will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.

Bulldog Hammermills are built in capacities up to 1000 tons per hour for every purpose: for primary, secondary, fine reduction of materials such as limestone, shale, Fuller's Earth, phosphate muck, phosphate mud balls, iron ore, oyster or clam shells, any reducible material.

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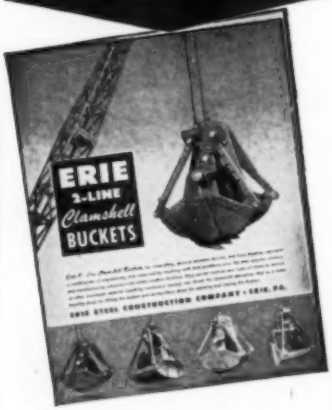
HOW TO GET
Larger
BUCKET
PAYLOADS



This new Erie Catalog makes it possible to quickly choose, from the 4 classes of Erie 2-Line Buckets, the right bucket for *your* crane and material. Perhaps your crane can operate a larger bucket, for Erie alloy welded steel buckets result in greater payloads through scientific bucket weight reduction. Remember, that on bucket work, the cost of the crane and the operator all ride on the bucket. Send for this helpful catalog or outline your conditions and our engineers will make recommendations.

Write for Catalog **2L-1** *Today*

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STEEL CONSTRUCTION COMPANY
415 GEIST RD., ERIE, PA

easy adjustments with diesel track-type tractors boost production, gives brief specifications of models, and has a chart breakdown of optional D8 transmissions providing special reverse speeds for various job applications. Also included are featured highlights of the new No. 8U Bulldozer.

Where to Get: Caterpillar Tractor Co., Peoria 8, Ill. (Free)

Title: **Bucket Repair**

Subject: Quick and inexpensive methods for rebuilding and repairing dipper teeth are fully described. Pertinent facts about where and how to use Manganal products to salvage worn dipper teeth are presented in detail with accompanying illustrations.

Where to Get: Stulz-Sickles Co., Newark 5, N. J. (Free)

Title: **Industrial Hardware**

Subject: Catalog of complete line of wire rope and chain fittings also contains engineering information. Presenting characteristics of each fitting to guide in selecting the proper fitting. Laughlin has included tables and charts which make it a reference book for engineers, architects, riggers and safety directors.

Where to Get: Thomas Laughlin Co., Portland 6, Maine. (Free)

Title: **Soil Survey**

Subject: Compiled by Rutgers University, College of Engineering, publication is of a general nature, indicating the soil environment and the research procedures which have been followed and will continue to be followed in the detailed soil mapping which continues throughout the State of New Jersey. It is the first of an extended series of succeeding county reports.

Where to Get: Bureau of Engineering Research, New Jersey State Highway Department, Trenton, N. J. ($1.50)

Title: **Conveyors**

Subject: Bulletin describes following equipment: all aluminum utility conveyor is one-man-operated, weighs 100 pounds, and handles sand, gravel, cinders, lime, etc.; light weight troughed belt conveyor is a portable conveyor with a high capacity, designed to handle sand, lime, gravel, crushed stone, ore, etc.; heavy duty troughed belt conveyor is ideal for car unloading direct to trucks and handles stone, loose earth, ore, even brick, tile and packages. The power moved troughed belt conveyor is for those extra heavy loading and stock piling jobs. Power moved belt car unloader will give you speed and ease in unloading railroad cars of sand, gravel, etc., to conveyors to trucks.

Where to Get: Fairfield Engineering Co., Marion, Ohio. (Free)

Title: **Retaining Walls**

Subject: Booklet describes how walls are used and shows how strength plus flexibility is incorporated in their design. Photographic descriptions show how walls are simply and economically installed with a minimum of excavation. Illustrated case histories also show where Armco bins have been used for embankments

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***SPEEDLAY PIPE SYSTEM*—completely packaged for fast-laying temporary and semi-permanent lines for water, compressed air, and other services.**

PILING—Sheet Piling—light weight • Tubular—all sizes

PILE SHEELS—Spiral Welded, Hel-Cor, Riveted, CAISSONS

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CULVERTS—Corrugated, Spiral or Riveted Steel

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along highways, railroads, lakes, streams and city streets. And in addition, they show how the walls can be used on curves and grades. Technical data on selection of design, and the units required for various types of sections as well as sketches showing typical applications are also included.

Where to Get: Armco Drainage & Metal Products, Inc., Middletown, Ohio.

Title: **Pump Bulletin**

Subject: Booklet covers Peerless Fluidyne pumps of the horizontal, end-suction centrifugal type driven by electric motors in sizes from ¼ to 150 hp, affording a capacity range from 10 to 5,500 gpm. Liquids can be pumped against heads up to 260 feet. Two types of pumps are offered in the line. One is a close-coupled electric motor driven pump. The other is a bracket-mounted pump for driving through a flexible coupling, of V-belt, or flat-belt pulley.

Where to Get: Peerless Pump Division Food Machinery Corp., Los Angeles 31, Calif. (Free)

Title: **Concrete Pump**

Subject: Book describes Pumpcrete machine and the method of pumping concrete through pipeline. It indicates on which type of jobs Pumpcrete will work to advantage, what type of mixes it will handle, and the height and distance requirements of a placing job.

Where to Get: Chain Belt Co., Milwaukee 4, Wis. (Free)

Title: **Welding Chart**

Subject: Wall-chart, 12x18 inches, designed to aid welders in selecting the particular welding, brazing, soldering, cutting or tinning alloy and flux that will best serve the job at hand and at the least cost. Data are arranged so as to make accurate selection as nearly automatic as possible. All alloys and fluxes are covered according to the metal upon which work is to be performed.

Where to Get: All-State Welding Alloys Co., Inc., White Plains, N. Y. (Free)

Title: **Road Coatings**

Subject: Two pieces of literature describing two newly designed products, the Bros Bituminizer and the Bros Spraymatic Bar. Specifications are given and method of operation is discussed. One section is devoted to related asphalt equipment.

Where to Get: Wm. Bros Boiler and Manufacturing Co., Minneapolis 14, Minn. (Free)

Title: **Mixer Catalog**

Subject: Bulletin describes and illustrates all recent improvements made on the new three-bag capacity machine. Describes all-welded heavy-duty frame construction that resists twisting, coil spring mounting to balance the mixer and cast steel drum heads with machined roller paths for smooth, extra long life operation. Bevel edge drum roller shafts revolve on large, internal double row, self-aligning ball bearings mounted in pillow boxes. The Model 16-S is powered by a 28 hp gasoline engine equipped with clutch. A spring loaded hoist clutch keeps band in proper expansion and eliminates frequent adjustments. A re-designed selective skip shaker operates on double contact points, one on each end of the charging skip supporting bar. Schematic drawings, listing the detailed dimensions of the 16-S Dandie, also are included in the catalog along with specifications on the extension track and tower loader attachments. Both of these units are included in the optional equipment listing with the batch hopper, water pump, auxiliary water tank, swivel chute and electric motor.

Where to Get: Kwik-Mix Co., Port Washington, Wis. (Free)

CUT DIGGING COSTS

with the new Sherman Power Digger

Patented, actuated bucket gives you selective digging action, better loading, greater versatility.

All-hydraulic action—made possible by heavy-duty hydraulic cylinders—assures efficient performance.

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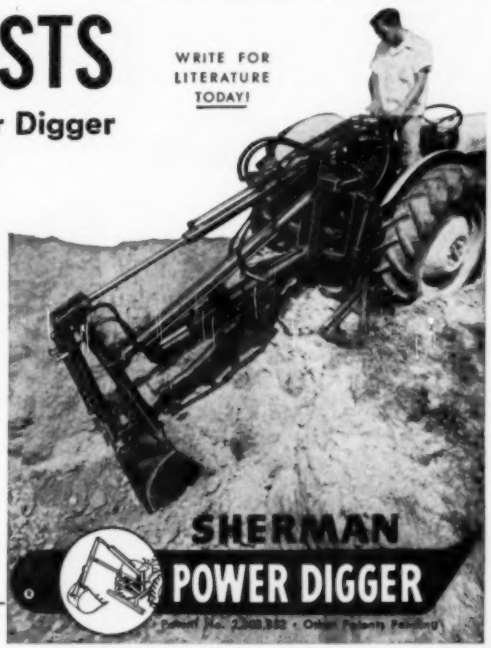

SPECIFICATIONS

Shovel reach below ground surface	8 feet
Digger reach behind tractor	10 feet
Swinging arc	140°
Trench width, standard digging shovel, single cut	18 inches
Digging shovel capacity	3.5 cu. feet
Loading shovel capacity	5 cu. feet
Loading clearance, digging shovel, loaded	7 feet
Loading clearance, loading shovel	10 feet

Standard tractor mounting gives unmatched maneuverability and transportability.

Digs ditches, trenches, footings, culverts, basements and other excavations.

Works well behind the tractor at any angle.

Actuated bucket raises high enough to load standard dump truck.

Handles roots, rocks, hard clay and oiled road surfaces.

Designed, Engineered and Manufactured Jointly By
SHERMAN PRODUCTS, INC. • Royal Oak, Michigan
WAIN-ROY CORP. • Hubbardston, Massachusetts
Sold Exclusively By SHERMAN PRODUCTS, INC.

SHERMAN PRODUCTS INC., ROYAL OAK, MICH.

"A Real Money Saver On 'In-Between' Jobs"

Says Construction Corporation Spokesman

"Our Hydrocranes have paid for themselves on a hundred and one 'in-between' jobs — ones too small for big rigs, too big for hand labor," says the general superintendent of a large construction corporation.

This firm, one of the largest engineering companies in the world, finds the Hydrocrane in a class by itself for mobility, quick set-up and precision control. Here is just a sample of the work handled by the company's two rigs on two power plant jobs totaling $22,000,000.

UNLOAD, STOCKPILE AND REHANDLE:

- 1½-ton Reels of Cable
- Pipe Fittings, Valves
- Wire Mesh
- Reinforcing Steel
- 55-gal. Oil Drums
- Structural Steel
- Timbers
- Concrete Conduit
- Porcelain Bushings
- Insulators
- Transformer Radiators

SET OR ERECT:

- Transformer Bushings
- Porcelain Insulators
- Air Brake Switches
- Transformer Radiators
- Sub-stations
- Structural Steel
- Oil and Water Pumps
- Boiler Tubing
- 14-in. Concrete Pipe
- 65-ft. Electric Poles

MISCELLANEOUS:

- Load Gravel
- Move Clamshell Buckets
- Hook Up Booms
- Handle Power Take-Offs
- Move Excavator Mats
- Load Snatch Blocks

EXCAVATE AND BACKFILL:

- Oil Pipe Ditches
- Conduit Ditches

Speed Pays Off

"When we have to move material in a hurry to avoid tying up a crew of men, our Hydrocrane is the machine for the job," said the job superintendent. "It takes this crane but five minutes to move, set up and begin work, where our crawlers would take half an hour just to move. And it's a waste of power to use these big cranes on jobs made to order for the Hydrocrane."

SOUTH MILWAUKEE BUCYRUS ERIE HYDROCRANE WISCONSIN

Here the company's 3-ton H-3 unloads reels of cable wire. With every crane function fully hydraulic, materials can be eased along a fraction of an inch if necessary.

Hoisting a truck front-end to permit wheel bearing inspection. Hydrocrane attachments available include clamshell, magnet, trash bucket, catch-basin bucket, 3-tine and multi-tine grapple and crane hook.

BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

Gentlemen. Please send Hydrocrane bulletins to:

Name .....

Company .....

Address .....

City ..... State .....

105HS1C

Spring Tonic

Continued from page 25

a cracked block has resulted from overheating due to clogged radiator fins.

While you're about this spring tonic job, clean and refill the air cleaner tray. In refilling use about ½ oil and ½ kerosene. This allows a better flow of air to the manifold without reducing the cleaning efficiency of the unit. Air cleaner connections should be tightened and the pipe from cleaner to manifold should be examined for holes or cracks. Abrasives entering the engine from improperly filtered air can cause serious damage to rings and sleeves.

On tractors with gasoline starting systems, it's a good procedure to check the gasoline strainer, then clean and wash the bowl at the same time. Distributor and magneto points should be checked for wear and correct gap setting.

Look at the diesel fuel water trap, too. It may be time to take it apart and clean it. "Spring tonic treatment" for tractors should include replacing oil filter elements. In most tractors, these elements should be replaced with each oil change.

Another good tip for spring and the year around is to service your battery. Clean terminals with hot water and baking soda and steel wool when necessary. Then coat them with vaseline. Be sure that the cells are filled with distilled water to ⅜ inch above the separators.

If the battery water level is constantly low, it may be a sign that it is being overcharged. The charging rate should be investigated and adjusted at once where necessary to prevent serious damage to the battery. To insure fast starting, lubricate the magneto impulse coupling with kerosene or light machine oil.

If transmission and final drive lubricants have not been changed for a season, now is the time to do it. If the oil in the transmission and final drive has been thinned during the winter for easier operation, the lubricant certainly should be changed to a heavier grade before hot weather. Work the tractor until the lubricant is warm and drain. Then refill with the proper grade of oil in accordance with the manufacturer's recommendation.

An item you can check by a quick inspection at this time is the track assembly. If the track is too tight or loose, excessive wear will result. Adjust tracks to the type of soil in which the tractor is operating.

A "spring tonic treatment" for tractors is like putting money in the bank. It pays off with interest later on in keeping your machines producing longer with fewer delays for repairs.

HYDRA-HAMMER and ONE MAN REPLACES ALL THESE!
REPLACES:
3 men each using a $300 jack-hammer
$4700 compressor for jack-hammers
$2900 tow truck and driver,
or
$3800 breaker and operator,
$5400 compressor for breaker
$2300 tow truck and driver for breaker and compressor
Save time and money on labor and equipment with the revolutionary Ottawa Self-Propelled Hydra-Hammer. No skilled operators needed for this multi-purpose tool, any man able to drive a truck can learn to operate the Hydra-Hammer in an hour.
The Hydra-Hammer travels under its own power up to 12 MPH. Converts from travel to work position by elevating the tower and shifting gears. No extra engine or hose couplings to slow production. The 400-pound hammer falls free, eliminating shock and high maintenance costs.
Write today for descriptive booklet . . . see how you can reap profits from the amazing Self-Propelled Hydra-Hammer!
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STEEL PRODUCTS, Inc.
INDUSTRIAL DIVISION
OTTAWA, KANSAS • U.S.A.

"It's easy once you get the hang of it."

Outside Curves

Continued from page 24

of curvature of the line marking the center of gravity of the stripping cut segment is 542.8 feet, and that of the spoil segment 709.7 feet.

The measured advantage, considering the practical stripping depth in a straightaway cut to be 60 feet and the actual stripping depth achieved on the outside curve to be 76.8 feet, is 28%.

The discrepancy between the results obtained by applying the proposed method as compared to actual field measurement is merely the difference between 30.7% and 28% which provides, in our opinion, suitable authentication of the method.

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date — 15th of preceding month. Example: January closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

Lima 2400 shovel equipped with 80 foot boom, 40 foot sticks and 5½ cu. yd. dipper. Location Central United States. Address inquiries to Box No. 3435.

Northwest 80-D combination shovel-dragline; Link Belt K-580 shovel (new 1948); three Euclids Bottom Dump, one 15-yard, two 12-yard.

Geo. F. Smith Company Inc.
5215 Manchester Avenue
St. Louis 10, Missouri

FOR SALE

750-B BUCYRUS-ERIE 16 cu. yd. electric shovel, full Ward-Leonard.

9-W BUCYRUS-ERIE 7 cu. yd. dragline, 200 foot boom, full Ward-Leonard.

Both machines will become available in September, 1951. Good stock of spare parts. Located in Middlewest. Inquiry Box No. 3438, c/o EXCAVATING ENGINEER.

Northwest model 25; 6; 80D; 95. Manitowoc 6500; 4500 new — will rent. Bucyrus 54-B; Monighan 5W; 7W; 9W; 450.
A. W. Nevers Phone 32 Mt. Pleasant, Iowa

Used, one-yard Osgood combination shovel and dragline by contractor. Good condition. Location Kansas. Reply Excavating Engineer, Box 3440.

Thew ¾-yd. crawler shovel with dragline bucket and 40-ft. boom. Powered by 100-HP Waukesha gasoline motor.

Davies Brick Company
Enid, Oklahoma

One new 4 cu. ft. Hayward multi-power orange peel bucket. Box 3443

Austin-Western motor grader-model 99. Four brand new spare tires. V-snow plow.
Jamara Bros. Inc.
Oakham, Massachusetts Tele. 22-21

BUCKETS FOR SALE

NEW WILLIAMS ⅝ c.y. light weight dragline bucket. Can be used on any half-yard machine. Priced below list.

OWEN CLAMSHELL ⅝ c.y. Type "M" digging bucket with counterweight and teeth. Excellent condition. Priced low for immediate sale.

Manning Equipment Company
Lansing, Illinois
P. O. Box 246 Phone Lansing 880-J

New shovel front for Bucyrus-Erie 22-B. Available for immediate sale.
The Bode Finn Company
2650 Spring Grove Avenue
Cincinnati 14, Ohio

Six Esco heavy duty dragline buckets 1¾ cu. yds. complete with renewable manganese steel inserts for back and bottom. Five of these buckets are brand new, the other one has worked for only approx. 100 hours. Bucket spares, specifications as follows: two E-7049-B RH wearing shoes; two E-7050-B LH wearing shoes; four A-6086 lower hoist chains No. 4; four A-6086 No. 3 upper hoist chains; two E-8775 hitch plate extensions; sixteen E-3496 trunnion pins; four A-9218 No. 4 drag chains; sixteen E-8639 trunnion link pins; sixteen E-5964 spreader bar pins; eight 1¾" S.D. hitch shackles; eight E-7594 S.D. hitch shackle pins; eighty C-32-B keys; one A-5277 No. 1 dump sheave pin; two A-5766 No. 2 roller bearings; eight A-4436 No. 1 retainers; eight A-4437 No. 1 retainer locks; four E-8900 lower hitch pin heads; eight E-7351 hitch plate extension bushings; eight E-3848 dump rope socket wedges; sixty-six No. 5 pins; sixty-six rubber plugs; eight C-50-B S.D. hitch shackle pin keys; four S-4181 upper dump rope sockets; two E-9183 drag rope sockets; two S-8 drag rope socket wedges; two E-4696 drag rope socket pins; two A-6365 No. 2 drag rope socket pin locks; two E-5242 dump rope sockets; two E-3849 dump rope socket wedges; two E-5243 dump rope socket pins; two A-6355 No. 2 dump rope socket pin locks; two E-5241 triangle plates; two E-7169 hitch chain shackles; two E-5244 hitch chain shackle pins; two A-6355 No. 2 hitch chain shackle pin locks; twenty-four C-33-C, two teeth; twenty-eight C-33-ACR-5 adapters; seventy-four R-5 points; 250 WOR-5 Weld-on points.

One 60' P&H No. 855 model dragline boom, brand new.

Clamshell equipment for dragline machine, including two new drums, new A-frame head, one additional sheave for boom point, new top boom section. Closing and holding ropes and tagline equipment.

Clamshell equipment for dragline lifting crane machine. Boom point sheave and guard, tagline equipment ropes for 45'0" boom. Box 3436

7—all-steel rocker dump cars, roller bearing, 30" gauge, 1 yd. 7 tons steel rails, 16 to 30 lb. straight and serviceable with 8 switches. One Bucyrus-Erie scraper, 4½ yd., 4-wheel. All of above in excellent condition.

Kentucky Clay Mining Company
Mayfield, Kentucky

New Dragline Buckets

2½ cubic yard Type AX dragline bucket. (Reconditioned.)

3 cubic yard Red Arch, Type AY heavy duty bucket.

Bucyrus-Erie Company
Parts Division
South Milwaukee, Wisconsin

Model 201 Buckeye Ditcher, Twin City gas engine, 27 foot max. cut. Ladder type. Machine in good condition throughout. Located in Oklahoma.

Pennington-Winter Constr. Co.
P.O. Box 5051 Oklahoma City 2, Okla.

Used 10-B shovel attachment for sale or trade for 10-B dragshovel attachment. Box 3442

Fairbanks-Morse diesel engine model 44-He10-300 h.p. for 5-W Bucyrus-Monighan dragline. This engine rebuilt under supervision of Fairbanks-Morse engineers and not used since being rebuilt. Details furnished upon request. Box 3441

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DREDGE MASTERS

Two experienced dredge masters for placer dredges owned and operated by internationally-known company. Location, South America. Excellent opportunity for steady work for men who can qualify. For further information, write to Box 3439.

EXPORT SERVICE ENGINEER required by manufacturer of tractor equipment. Should be well advised on crawler tractors and allied equipment. Must be willing to travel abroad. Box 3428

POSITIONS WANTED

Position wanted as shovel operator. Can operate any make of machine; shovel; dragline; clamshell, or crane. Steam, gas, diesel, or electric. Large or small machines. Also experienced on water well rigs. Virgil Dick, P.O. Box 8, Hurricane, West Virginia. Phone 2224.

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tells the story of Primacord, the Detonating Fuse that is standard blasting procedure in stripping and quarrying. Ask for a copy.

As shown on the booklet from left to right: Plastic Reinforced Primacord for very deep, wet holes, river crossings, etc. . . . Plain Primacord, for surface trunk lines and shallow holes . . . Reinforced Primacord for deep holes where extra tensile strength or resistance to abrasion are desirable . . . Wire Countered Primacord for deep, ragged holes and high abrasive conditions.

Choose the brand that meets your conditions and you will also choose safety, simplicity of hook-up, ease of use, freedom from the danger of stray currents, and best results from a minimum quantity of explosives.

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Simsbury, Connecticut
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Dig and dump . . . speed the cycle . . . take those shocks . . . *stay on the job*—that's the big order you give a hoist rope. To have it filled, put *Preformed* Yellow Strand Hoist Rope on your power shovel. Specify Lang Lay with Independent Wire Rope Core—6 x 19 for ropes up to and including 1″ in diameter, 6 x 41 for sizes 1⅛″ and larger.

In *Preformed* Yellow Strand, whatever the construction, internal stresses have been relaxed. You gain with longer rope life, fewer shutdowns for replacement, more production for your rope dollar. Call your B & B distributor now so you'll have a real *working* rope on hand when it's time to change your hoist, drag, scraper or other heavy-duty line.

Broderick & Bascom Rope Co., St. Louis 15, Mo.

Branches: New York, Chicago, Houston, Los Angeles, San Francisco, Portland, Seattle *Factories:* St. Louis, Peoria, Houston, Seattle

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Yellow Strand

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